Nature Magazine

MARCH
1954

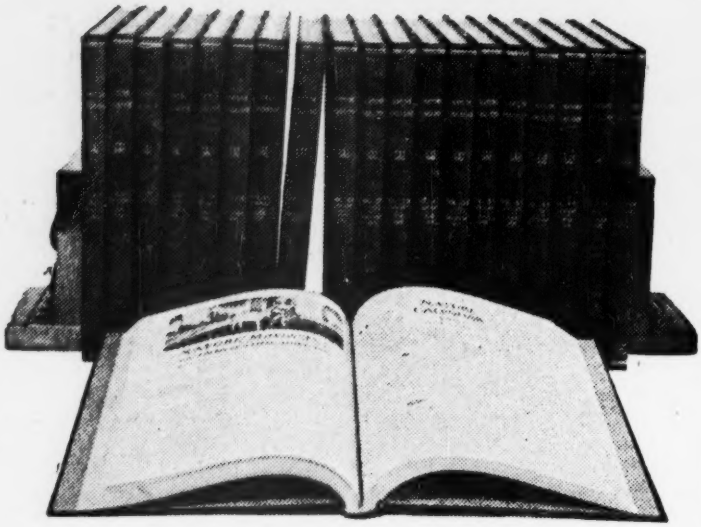
VOLUME 47
NUMBER 3

50 Cents

A STOREHOUSE OF NATURE INFORMATION

Bound Volumes of NATURE MAGAZINE

Give you an Incomparable reference Library on Nature subjects unobtainable elsewhere at any price



HERE is an encyclopedia of nature information utterly unlike any other you could obtain — a compilation of the material that has appeared month after month in NATURE MAGAZINE — a wealth of fascinating stories about BIRDS, MAMMALS, FISHES, PLANTS, INSECTS, TREES, SKIES and other phases of Nature and the outdoors. Scientifically accurate and unique in its scope and completeness. Every school, every library, every home will be enriched by possessing these valuable and attractive volumes.

Volumes 1 to 30 include six issues of Nature Magazine. Commencing with Volume 31, ten issues are bound into attractive books. Volumes 1 to 19 are bound in dark green cloth with gold letters. All subsequent volumes are bound in dark brown imitation leather and stamped in gold.

This is an opportunity to secure those missing from your present set of bound volumes. Or, if you have not been keeping them, start now with a full set of those obtainable. No additional copies of these volumes can be had after those now on hand are gone. Volumes 1 to 10 (inclusive), have been completely sold. Copies of all other bound volumes are still available but going fast. Most of the missing volumes can be furnished in loose copies, prices furnished on request.

A BARGAIN AT THESE PRICES

Volumes 2, 12 to 30 ..... $3.00 each
Containing six issues

Volumes 31 to 39 ..... $5.00 each

Volume 40 and up ..... $6.00 each
Containing ten issues

Considering the information these books contain, the many beautiful pictures and the durable and handsome binding, these are remarkable values.

Mail your order promptly, using the convenient coupon. Or write separately if you do not wish to mutilate your magazine.

AMERICAN NATURE ASSOCIATION
1214 Sixteenth Street, N. W., Washington 6, D. C.

Volumes 2 to 30 $3.00 Each
" 31 to 39 $5.00 Each
" 40 up — $6.00 Each

Send me postpaid the bound volumes of Nature Magazine checked below.
My check for ..... in full payment is enclosed.

Name.....

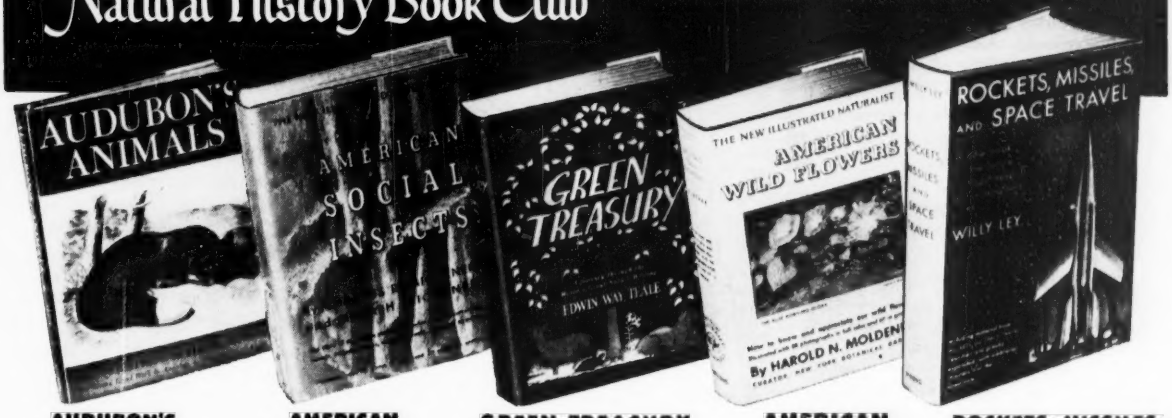
Street and No.....

City and State.....

2 3 12 13 14 15 16 17 18 19 20 21 22 23 25 26 27 28 29 30 31 32 39 40 41 42 43 44 45 46

any of these exciting selections FREE! if you now join the Natural History Book Club

That's right! Choose ANY selection on this page as your FREE membership gift . . . and choose ANY as your money-saving first selection. Check your choices on FREE-GIFT Coupon below and mail TODAY.



AUDUBON'S ANIMALS

Edited by ALICE FORD

A handsome collector's piece! The complete set of 156 inspired animal prints from Audubon's priceless original editions, plus 16 large full-color plates never before published in book form.

Retail price $12.50

To members, only $7.75

AMERICAN SOCIAL INSECTS

by CHARLES D. MICHENER and MARY H. MICHENER

Here's the whole amazing social story of the bees and ants, wasps, hornets and termites, living in highly organized societies some of which date back 30 million years before Man. With 109 magnificent illustrations, 30 in color.

Retail price $6.00

To members, only $4.90

GREEN TREASURY

Edited by EDWIN WAY TEALE

Over 180 authors reveal man's varying outlook on nature through the ages . . . from Aristotle's report on the elephant to Rachel Carson's writings on the sea around us. Never has any volume equalled this wide variety of scientific knowledge on plants, animals, man and elements.

Retail price $5.00

To members, only $4.00

AMERICAN WILD FLOWERS

by HAROLD N. MOLDENKE

Compiled by an eminent botanist, this beautiful book describes over 2,000 species of wild flowers growing in North America. Authoritatively written and lavishly illustrated with 157 photographs, of which 88 are in full color.

Retail price $6.95

To members, only $5.60

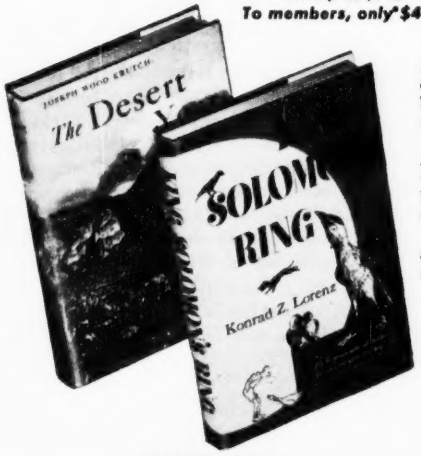
ROCKETS, MISSILES, AND SPACE TRAVEL

by WILLY LEY

Soar through the ages into the future! Not fiction, but thrilling facts . . . including preview of actual flights to moon and planets, permanent space stations, fantastic weapons, and much more. *Illustrated.*

Retail price $5.95

To members, only $4.75



DESERT YEAR

by JOSEPH WOOD KRUTCH

You'll come to know the fascinating animals and plants, and actually feel the vastness of desert space and sky, in this exciting book by a man who lived in the desert of Arizona. *Illustrated.*

KING SOLOMON'S RING

by KONRAD Z. LORENZ

This famous naturalist spent a lifetime of joyous study to bring you delightful information on almost every imaginable bird, insect, animal, reptile and fish. *Illustrated.*

DUAL SELECTION

Combined retail price $7.25 ***To members, only $5.75***

YOUR BENEFITS AS A MEMBER

It costs nothing to join this distinguished club that saves you money on the best books on nature, travel, exploration and science!

Each month you receive *free* the Club *News* describing the forthcoming selection. If you do not want this forthcoming book, you simply return a printed form which is always supplied.

You accept only the books you want, and pay *after* you receive them at the special, reduced member's price plus a small fixed mailing charge. For each four additional selections you accept, you receive a FREE Bonus Book. You agree to accept a minimum of four selections a year, and may cancel your membership any time after accepting four selections.

Right now, decide which of these six exciting selections you wish as your FREE MEMBERSHIP GIFT—and which you want as your first selection. Quantities of many titles are running short. Send no money! Just mail Coupon TODAY!

AS MUCH AS $17.50 WORTH OF BOOKS FOR AS LITTLE AS $4.00 IF YOU JOIN NOW

Mail this FREE-GIFT Coupon TODAY!

NATURAL HISTORY BOOK CLUB, INC.
Dept. 2064, 11 East 36th St., New York 16, N.Y.

Please enroll me as a member and ship me immediately the choice I have checked as my FREE MEMBERSHIP GIFT, plus my FIRST SELECTION at the special, reduced membership price plus 25¢ for postage and packing. I am to receive the Club *News* FREE every month, and a FREE Bonus Book for each four additional selections I accept. I will accept at least four Club selections the first year I am a member.

Free Membership Gift	*First Selection*
☐ AUDUBON'S ANIMALS	$7.75 ☐
☐ AMERICAN SOCIAL INSECTS	4.90 ☐
☐ GREEN TREASURY	4.00 ☐
☐ AMERICAN WILD FLOWERS	5.60 ☐
☐ ROCKETS, MISSILES, AND SPACE TRAVEL	4.75 ☐
☐ DESERT YEAR and KING SOLOMON'S RING	5.75 ☐

Name

Address

City Zone State

Nature in Print

By HOWARD ZAHNISER

"THIS was a great land, a good land about which little was known to the average man, and much of that knowledge false. It was also a land which had been good to me, and that had been my home." So reflected Erik Munsterhjelm as he was flying out of the Canadian northland of which he has written in *The Wind and the Caribou*. The experiences his volume relates, of hunting and trapping "in the real unspoiled wilderness," apparently took place some two decades ago, but the book has just recently become available, and it fits well with our increased attention to the north country. It can be read with interest, not only as a tale of adventure, but, also, as a description of north country conditions that can be inspiration and challenge to people of a complicated civilization.

The volume's appeal arises thus not only from the character of the author and his associates but from the country and its wild denizens. It is the country called the Canadian Shield, "that vast area, underlain by granite, that surrounds Hudson's Bay in a great arc; a land of thousands and thousands of lakes, rivers, and other waterways, from inland seas like the Great Bear Lake to little, marshy sloughs." It is a country still vital with wild animals, where herds of caribou come and go so mysteriously that the Chipewyan Indians have concluded that "nobody knows the way of the wind and the caribou," a land where wolves are, too.

To this land, lured materially by the profit promised by the pelts of the land's furbearers, and by its fish and caribou resources for sustenance, Erik Munsterhjelm came from California, having there been driven "nuts" by the heat as he worked on a desert concrete-bridge construction job, having stood as long as he could—namely, for "two long years"—California's "perpetually clear sky, its burning sun and its everlastingly dry, hot, and even climate."

After a long journey that culminated in almost three months of rowing and paddling for some six hundred miles, he settled in with his companion at "the forks" where the Porcupine River from the north and the Nest River from the east join, and where the trappers lived the winter through in the cabin they built there.

The next winter Erik Munsterhjelm himself flew in by airplane to Enn Lake, "about sixty miles north-west of Fon du Lac, near the border of the North-West Territories," and there spent another trapping season.

These two seasons are the time of *The Wind and the Caribou*.

One of the interests in Erik Munsterhjelm's book is, of course, in its accounts of the wild animals as he observed them and in the opinions it expresses regarding them. "More attention," Munsterhjelm maintains, "should be paid to the opinions of successful professional hunters and trappers. They have a wide knowledge of wildlife, plenty of experience and keen powers of observation," he says. "A truer picture of the wilds and, for instance, of this question of caribou and wolves would emerge if their opinions were gathered, he believes."

It is, unfortunately, not feasible to relate these exciting experiences on this page, or to summarize the stimulating or provocative opinions that arise from them, but we can agree that a gathering of such opinions would surely be a contribution to an understanding of our north country wildlife—and we can hope that the wildlife itself will live on into the era of our better understanding.

(We can also hope that the cruel trapping of these northern furbearers will end; as "adventurous" as the life of trappers is, there is sheer horror at the thought of the animals in their traps.)

Green Dissidents

By JOHN NIXON, JR.

Cedars in our community
Are geometric as a tree
Euclid designed might grow to be.

Some tend to roundness like a ball.
Some seem majestically tall
Obelisks. Some are conical.

Air, that incomparable hone,
Has sharped the apex of each cone—
Except the two upon our lawn.

Whose eerie posture and distressed
Foliage invite no bird to nest
In such unsweet, unneat unrest.

It is a considerable distance from Erik Munsterhjelm's country to Alaska, and those who know both regions well—or either—will doubtless think much of their differences. Yet to those of us who are distant from both and not acquainted with either, they both seem so much a part of the great north country that we value Munsterhjelm's personal narrative in our own concern with Alaska, and we can read it with interest along with, for example, A. Starker Leopold's and F. Fraser Darling's field study report, which they entitle *Wildlife in Alaska: Ecological Reconnaissance*.

Arriving in Alaska on June 1, 1952, these two naturalists—Leopold, a zoology professor at the University of California with a great conservation reputation, and Darling, an ecologist and conservationist from the University of Edinburgh,—spent the entire summer in the territory, terminating their visit with the Alaska Science Conference at Mt. McKinley National Park late in September.

Dealing particularly with the status of caribou, moose, and reindeer, they comment that "perhaps even this limited segment of Alaska's conservation problem was more than we could assimilate in so short a period." With such humility and awareness of their limitations they hasten, however, to add: "Our task, as greenhorns spending four months in 586,000 square miles of territory, has not been to solve the problems of conservation, but to make an objective appraisal of them." In doing this they had an advantage as "outsiders, looking in upon new and fascinating ecologic situations," and they brought to their consideration of present programs "an objectivity of analysis that is denied the government employee who is surrounded by an aura of existing policies, programs, and commitments."

As Fairfield Osborne so well summarizes in a brief foreword, the general recommendation is for "a broader and a more coordinated approach to the management of these resources"—that is, "the living natural resources on the land and in the adjacent waters." Along with the authors, Mr. Osborne emphasizes the "unique opportunity to initiate a comprehensive program *before* the territory is subjected to haphazard development."

"One of the recommendations made by the authors" and emphasized by Mr. Osborne, who observes that it "will surely be endorsed by conservationists, natural scientists, and sportsmen everywhere," calls for the establishment of wilderness areas in Alaska "before it is too late."

The values which "already exist on much of the Territory—wild fish and game, and the opportunity for wilderness recreation," in the judgment of the authors, "offer the highest use to which the land can be put." They warn that "to tear up the wilderness in such country, hoping to produce something 'better', is often a serious mistake." They write at some length as follows:

"There are at present only four national monuments (Katmai, Glacier Bay, Sitka, and Kasaan) and one national park (Mt. McKinley) set aside to preserve features of tourist interest. There will be need for other such areas, especially in southern Alaska. Some of the National Wildlife Refuges, administered by the Fish and Wildlife Service, and various areas under management of the Forest Service and the Bureau of Land Management will serve these needs in part, but the Park Service is specifically equipped to cope with large numbers of recreationalists and should be fully supported in the effort.

"In addition to developing areas for mass recreation, there should be adequate provision for reserving large blocks of country in *wilderness* status, to act as reservoirs of wilderness game and to serve the needs of the more discerning outdoorsmen who wish to get completely away from roads and crowds. At present so much of Alaska is more or less isolated that wilderness preservation may seem to be no problem, but experience in the western United States indicates that wild mountain country can be conquered and tamed with alarming rapidity under the pressure of growing populations.

"The time to select and set aside wilderness areas is today, before development begins. Parts of Katmai and Glacier Bay National Monuments and of McKinley Park serve the purpose admirably, but these reservations are by no means enough. Wilderness areas should be designated in the national forests of the southeast, in some of the central mountains such as the Kilbuck and Wrangell ranges, and perhaps most importantly in the northern mountain and tundra complex.

"The eastern Brooks Range sloping down to the Arctic plain on the north and to the Yukon Valley on the south would be an ideal Arctic wilderness area," Leopold and Darling conclude.

"Not only would such a reservation," they point out, "serve to maintain a sample of the primitive north land for posterity, but it could be a base for long-term ecological studies of the Arctic flora and fauna."

As these authors say, "the scientific importance of reserving such study areas cannot be overemphasized." Their own report shows that, already, "the seemingly remote Arctic has been so changed by fire, reindeer grazing, wolf control, hunting, and fishing that there is shockingly little of it left unaltered." In connection with their own analysis of the problems in preserving the great caribou resource, they point to the need for a study of the caribou "in its specific relations to the flora and to other animals" and recall their earlier recommendation of an Arctic wilderness area. The study, they write, should preferably be carried on "in an isolated situation with a minimum of interference by changing patterns of hunting and of land use." "The great wilderness of the eastern Brooks Range," they then suggest, "would be an ideal place to conduct such a study."

Sally Carrighar in her *Icebound Summer* has shown that such wildernesses can not only be the scenes for the kind of personal experience that Erik Munsterhjelm narrates, and for the scientific studies that Starker Leopold and Fraser Darling contemplate and exemplify, but also the inspiration for the genre of creative literature that she has so well developed already in *One Day on Beetle Rock* and *One Day at Teton Marsh*. This writing is to our understanding of wild creatures what our great novels are to an understanding of human nature: it makes real to its readers the wilderness environment as the great novels do the social surroundings of their characters. *Icebound Summer* is a beautiful expression of keen perception, a poignant statement of an attitude of deep thinking. And it is fascinating true fiction.

By studying the animals and their environments, and pondering their natures and their compulsions, Sally Carrighar has prepared herself to write of these creatures with the sympathy that a novelist or dramatist has for created characters. Thus without "nature faking", without humanizing other forms of life, she has yet done her perceptive and creative best to make these creatures live for us her readers. Nor is her achievement diminished by her inclusion of Eskimos among the characters of *Icebound Summer*, for she makes it apparent that they are a part of the region that becomes her locale. In fact, her narrative entitled "The Brave Fawns," bringing to life in its pages two children ineffably brave in the midst of stark circumstances, is as profoundly and beautifully moving a tale as one could hope to have at hand.

Not always does a reviewer find the comments of a dust jacket in accordance with his own impressions, but for *Icebound Summer* Mr. Knopf's commentator has written a comment that is here endorsed and quoted in full as follows:

"Most books about the Arctic are concerned with its winter of white desolation and seemingly endless solitude. In *Icebound Summer* Sally Carrighar recreates in an unforgettable way the mood and events of that brilliant but tenuous season in the far North when winter briefly relaxes its frozen grip on the earth, and all living things participate in a drama of intensity not paralleled elsewhere. To the northwest coast of Alaska, where Miss Carrighar spent three years observing the rhythm of the seasons and gathering material for this book, millions of birds and animals return each spring, as if overnight, for the timeless ritual of courtship and mating and birth of their young. It is the time of the year when the sea ice withdraws, momentarily, and the permafrost in the soil thaws just enough to permit an unbelievable burgeoning of flowers and other plant life—a time of almost heartbreaking loveliness, but also a time when the struggle for survival and perpetuation of species is raised to its highest pitch.

"With the skill of the born storyteller and the selective eye of the practiced naturalist," continues the skillful and practiced writer of book-jacket comments, "Miss Carrighar records the joys and ordeals of animals and humans alike at this climactic moment of their lives—when life and death are but a step apart, when the hunter becomes the hunted. Whether it is the nearly incredible mass migration

(Continued on page 117)

To people who want to write

but can't get started!

Do you have that constant urge to write but fear that a beginner hasn't a chance? Then listen to what the former editor of Liberty said on this subject:

"There is more room for newcomers in the writing field today than ever before. Some of the greatest of writing men and women have passed from the scene. Who will take their places? Fame, riches and the happiness of achievement await the new men and women of power."

SELLS FOUR ARTICLES AT BEGINNING OF COURSE

"Before I had finished the third assignment, I sold four articles that have brought in over twice the cost of the course. Had anyone told me when I began the N.I.A. Course, that I could do that, I would have considered him crazy."—Walter F. Roper, 95 Benedict Terrace, Longmeadow, Mass.

Writing Aptitude Test FREE!

The Newspaper Institute of America offers a FREE Writing Aptitude Test. Its object is to discover new recruits for the army of men and women who add to their income by fiction and article writing.

The Writing Aptitude Test is a simple but expert analysis of your latent ability, your powers of imagination, logic, etc. Not all applicants pass this test. Those who do are qualified to take the famous N.I.A. course based on the practical training given by big metropolitan dailies.

This is the New York Copy Desk Method, which teaches you to write by writing! You develop your *individual* style instead of trying to copy that of others. Although you work at home, on your own time you are constantly guided by experienced writers. You "cover" actual assignments such as metropolitan reporters get.

It is really fascinating. Each week you see new progress. In a matter of months you can acquire the coveted "professional" touch. Then you are ready for market with greatly improved chances of making sales.

Mail the Coupon Now

But the first step is to take the FREE Writing Aptitude Test. It requires but a few minutes and costs nothing. So mail the coupon now. Make the first move towards the most enjoyable and profitable occupation — writing for publication. Newspaper Institute of America, One Park Avenue, New York 16, N. Y. (Founded 1925.)

Free

Newspaper Institute of America, One Park Avenue New York 16, N. Y.

Send me, without cost or obligation, your free Writing Aptitude Test and further information about writing for profit as promised in Nature Magazine, March 1954.

Miss / Mrs. / Mr. .....

Address .....

City ..... Zone ..... State .....

— Check here if Veteran.

(All correspondence confidential. No salesman will call on you.) 87-C-664

Copyright 1953 Newspaper Institute of America.

NATURE MAGAZINE

PUBLISHED BY THE AMERICAN NATURE ASSOCIATION

To Stimulate Public Interest in Every Phase of Nature and the Out-Of-Doors, and Devoted to the Practical Conservation of the Great Natural Resources of America

IN THIS ISSUE

March, 1954 Vol. 47, No. 3

Nature in Print ..... Howard Zahniser 114
Green Dissidents (Poem) ..... John Nixon, Jr. 114
Contents Noted ..... R.W.W. 119
North Carolina's "Low Country" Comes into Its Own ..... Charlotte Hilton Green 121
Passing Storm (Poem) ..... Eleanor B. Steiner 124
Shrews Is Shrews ..... Ernest P. Walker 125
City Trees (Poem) ..... John D. Engle, Jr. 128
Ant House Guests, Good and Bad ..... Ross E. Hutchins 129
The Versatile Hau Tree ..... N. W. Harris 131
Catoctin Spring Days (Poem) ..... Harry C. York 132
Chinese Stories in the Sky ..... Mabel Irene Huggins 133
Spring (Poem) ..... Norman Rocheville 136
Babes of the Woods ..... E. Laurence Palmer 137
Editorial 145
Spencer Fullerton Baird ..... W. L. McAtee 146
Brewer's Blackbird (Poem) ..... Ruth Seymour Vesely 148
Woodlawn, A Washington Legacy ..... Helen Duprey Bullock 149
Rain Delay (Poem) ..... John Gallinari Whidding 150
Jeff's Wild Guests ..... Bert Van Cleve 151
Protest (Poem) ..... Mae Norton Morris 152
Life's Spark in A Pine Seed ..... Edwin A. Mason 153
Hatching Reptile Pets ..... Barbara Hunt 154
A Penguin Swims ..... Hugo H. Schroder 155
Jupiter and His Family ..... Isabel M. Lewis 156
Winter Matter (Poem) ..... Ray Romine 157
The School Page ..... E. Laurence Palmer 158
Camera Trails ..... Edna Hoffman Evans 160
Under the Microscope ..... Julian D. Corrington 166

A. B. McClanahan, Advertising Manager

ADVERTISING OFFICES

New York 17-295 Madison Ave. Los Angeles 5-2978 Wilshire Blvd.
Washington 6-1214 16th St., N.W. San Francisco 4-Mills Building
Chicago 1-35 E. Wacker Dr. Minneapolis 2-527 2nd Ave., So.

NATURE MAGAZINE is published monthly, October to May, inclusive, bimonthly, June to September, inclusive, by the American Nature Association. Entered as second-class matter May 31, 1927, at the post office at Washington, D. C., U. S. A., and accepted for mailing purposes at the special flat rate of postage provided for in the United States Postal Act of October 3, 1917, and February 28, 1925. $4 a year; foreign, $5.00. Additional entry Easton, Pa.

Publication and Editorial Office, 1214 16th Street, N. W., Washington 6, D. C. Additional office of publication, Easton, Pa.

Copyright, 1954 by American Nature Association, Title Registered U. S. Patent Office. Printed in the United States.

THE ASSOCIATION

RICHARD W. WESTWOOD ..... President
Washington, D. C.

HARRY E. RADCLIFFE ..... Vice-President
Washington, D. C.

JAMES A. O'HEARN ..... Secretary-Treasurer
South Orange, N. J.

DR. E. LAURENCE PALMER .. Director, Nature Education
Cornell University, New York

ARTHUR NEWTON PACK ..... President Emeritus
Tucson, Arizona

THE MAGAZINE

RICHARD W. WESTWOOD ..... Editor
EDWARD A. PREBLE ..... Associate Editor
JULIAN D. CORRINGTON ..... Microscopy Editor
ISABEL M. LEWIS ..... Astronomy Editor
E. LAURENCE PALMER ..... School Editor
HOWARD ZAHNISER ..... Book Editor
EDNA HOFFMAN EVANS ..... Photography Editor
HARRY E. RADCLIFFE ..... Business Manager
WILLIAM H. CARR ..... Director, Arizona-Sonora Desert Museum

SCIENTIFIC CONSULTING BOARD

DR. WALDO L. SCHMITT
Head Curator, Zoology, U. S. National Museum

DR. HARRY C. OBERHOLSER
Retired Ornithologist, U. S. Fish and Wildlife Service

W. L. McATEE
Retired Biologist, U. S. Fish and Wildlife Service

DR. PAUL BARTSCH
Retired Curator of Mollusks, U. S. National Museum

DR. EDGAR T. WHERRY
Wild Flower Preservation Society

DR. WILLIAM M. MANN
Director, National Zoological Park

DR. EDWARD A. CHAPIN
Curator of Insects, U. S. National Museum

NATURE MAGAZINE PAST AND PRESENT, IS INDEXED IN THE READER'S GUIDE IN YOUR PUBLIC LIBRARY

U. S. AND CANADA
ONE YEAR $4
FOREIGN .. $1 EXTRA
TWO YEARS $7
LIFE $100

NATURE IN PRINT

(Continued from page 115)

of the lemmings and their suicidal rush to the sea, the annual flight of the arctic tern from the antarctic, ten thousand miles away, the pursuit of beluga whales and seals by the packs of dreaded killer whales, the mysterious passage of the golden plover across the unmarked vastness of the Pacific to Hawaii, or the encounter of an Eskimo hunter with a rogue walrus, the reader is caught up in the impelling drama of natural forces at work. The eleven chapters of this superb book evoke a world filled with beauty and terror, tenderness and suspense, and the eternally fascinating mystery of the primitive impulses of life itself."

Of lingering, haunting interest is Sally Carrighar's re-creation of the mass movement of the lemmings, seeking relief from the nervous tension of their own surplus numbers, finding their solace in the sea, which they enter in mass, as they would any river to cross, but in which they eventually perish. Entitled "High Tension," the first of the two chapters in which this drama is told somehow or other sets one to pondering on the hazards of our own high tensions in crowded cities and recalls again the values to human beings of those wildernesses where such tensions can be relieved before ever they reach the breaking point.

Icebound Summer. By Sally Carrighar. New York: Alfred A. Knopf. 1953. 262 pp. ($5\frac{3}{4}$ by $9\frac{1}{2}$ in.) with 22 drawings by Henry B. Kane and a 2-page map by Skaggs. $3.95.

Wildlife in Alaska: An Ecological Reconnaissance. By A. Starker Leopold and F. Fraser Darling. Sponsored by the New York Zoological Society and the Conservation Foundation. New York: The Ronald Press Co. (15 East 26th Street, New York 10.) 1953. 129 pp. ($5\frac{3}{8}$ by $9\frac{1}{4}$ in.), with foreword by Fairfield Osborne, 6 text maps, 22 photographs in 16-page center section, bibliography, and index. $2.75.

The Wind and the Caribou: Hunting and Trapping in Northern Canada. By Erik Munsterhjelm. New York: The Macmillan Co. Undated. 234 pp. ($5\frac{1}{2}$ by $9\frac{5}{8}$ in.), with tipped-in folded map of Canada, reproduced from *The Canada Year Book.* $3.

Wildlife Booklets

Two new booklets have been added to the list of those describing areas under the administration of the U. S. Fish and Wildlife Service. The series is known as "Conservation in Action." The ninth booklet is entitled "Stillwater Wildlife Management Area," and the tenth "Red Rock Lakes, A National Wildlife Refuge for Trumpeter Swans." Each is available from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C., for fifteen cents.

Briefly Noted

Those of the Forest. By Wallace Byron Grange. Babcock, Wisconsin. 1953. The Flambeau Publishing Company. 314 pages. Illustrated by Olaus Murie. Fascinating reports on outdoor experiences and observations by Wisconsin's first Superintendent of Game.

My Bird Dogs and Hounds. By William Gordon Means. Boston. 1953. Bruce Humphries, Inc. 154 pages. Illustrated $3.73. A sportsman writes of his companions at home and afield.

Pioneer Plant Geography. By W. B. Turrill. The Hague, Netherlands. 1953. Martin Nijhoff, 9 Lange Voorhout. 267 pages. Illustrated. Nineteen Guilders. The phytogeographical researches of Sir Joseph Dalton Hooker and a valuable botanical book for botanists.

An American in Europe. By Egon Larsen. New York. 1953. The Philosophical Library. 224 pages. Illustrated. $4.75. The life of Benjamin Thompson, Count Rumford, whom Franklin Roosevelt rated with Jefferson and Franklin

Abundant Life. By Dr. Francis H Glazebrook. Boston. 1953. Christopher Publishing House. 185 pages. $3.00. A doctor speaks of health against a background of fifty years of practice.

Science and Man's Behavior. By Dr. Trigant Burrow. New York. 1953. The Philosophical Library. 564 pages. $6.00. The contribution of phylobiology to the knowledge of man and his neuroses.

Pet Shop Manual. By Joseph B. Roberts, Jr., Bernice Cool and Wayne H. Riser. Fond du Lac, Wisconsin. 1953. All-Pets Books, Inc. 96 pages. $2.50. How to start a pet shop and conduct it.

Culture and Diseases of Game Fishes. By H. S. Davis. Berkeley, California. 1953. University of California Press. 332 pages. Illustrated. $5.00. An important book for the fish biologist and wildlife administrator.

Geography

Geography in the Twentieth Century. Edited by Griffith Taylor. New York. 1953. Philosophical Library. 661 pages. Illustrated with 14 plates, folding map and 56 text illustrations. $8.75.

This volume is the work of twenty-two authors, each one an authority in the specialized section about which he writes. Collectively, this book explores the growth, fields, techniques, aims and trends of geography. The characteristics of its evolution since 1900 are emphasized. The book has been divided into three parts, the first dealing with the evolution of geography and its philosophic basis; the second with studies of special environments and advances in geomorphology, meteorology, climate, soils and regionalism; the third with field work, sociological and urban aspects, the function of the Geographical Society and geo-pacifics. This is a second edition that has been revised and enlarged.

Planning help for
Western Vacations

Enjoy the Super Dome
OLYMPIAN Hiawatha

There's extra pleasure without extra cost in viewing mountain wonderlands from the Super Dome—the *only* dome car to the Pacific Northwest. Private-room cars with Skytop Lounge, Touralux sleepers that save on rail fare and berth cost, leg rest coaches, diner and Cafe Lounge on the fast Olympian HIAWATHA.

1. PACIFIC NORTHWEST—Coulee Dam; Seattle-Tacoma with Puget Sound, Mt. Rainier, Olympic Peninsula, Victoria and Vancouver, B. C.
2. YELLOWSTONE PARK—via Gallatin Gateway. Old Faithful, Grand Canyon. Also Montana Rockies.
3. DUDE RANCHES.
4. PACIFIC NORTHWEST—Yellowstone.
5. COLORADO ROCKIES—Salt Lake City-Yellowstone.
6. CALIFORNIA—Oregon-Washington-Idaho-Montana.
7. CANADIAN ROCKIES—Victoria, Vancouver-Pacific Northwest.
8. ALASKA.
9. ESCORTED TOURS.

H. Sengstacken, The Milwaukee Road, 801 Union Station, Chicago 6, Ill.

I am interested in vacations 1 2 3 4 5 6 7 8 9 (circle choices). Please send free literature and Super Dome folder.

*Name*_____

*Address*_____

*City*_____ *Zone*____ *State*_____

THE MILWAUKEE ROAD

ANSS Meets

An outstandingly varied program that held special interests for many and general interest for just about everybody was offered at the sessions of the American Nature Study Society in Boston December 26 to 29, 1953, with a field trip climaxing the meeting on December 30. Ruth C. Hopson of Oregon was elected President for the coming year, succeeding Roger Tory Peterson, who, with signal aid from the Massachusetts Audubon Society, was mainly responsible for the successful 1953 sessions.

Although it sounded as though it would be primarily interesting to photographers, the opening session on Saturday afternoon, December 26, was fully as fascinating to those who never clicked a shutter. It started off with Richard Borden explaining the tricks he could do with his camera gun, and then proving it with movies taken with this clever and intricate invention. Then came Henry B. Kane, who explained some of the tricks of use of the stroboscopic flash, with beautiful slides to show his mastery of this specialized field in photography. Two youngsters from Marblehead, Massachusetts—Torrey Jackson and David Tucker—demonstrated that the will to take good Nature photographs is important and that fancy equipment is not always necessary. Their cameras were old ones and their gadgets home-made, but the color slides they were able to show for their work were definitely in the professional class. The final speaker-photographer was G. Blake Johnson, who described his work with 3-D photography, and then, after supplying the audience with 3-D glasses, showed some of the startling slides that resulted.

Sunday, December 27, was a full day, the morning session opening with Ted Pettit of the Boy Scouts of America describing the revised and redynamized program in Nature study now offered to the Scouts. Charles Mohr presented a splendid and practical paper on the effective use of field trips in Nature study work, a paper worthy of publication by itself as a key to field trip conducting. Speaking from the background of the second oldest Children's Museum in America, that in Jamaica Plain, Massachusetts, Miriam E. Dickey ably demonstrated how valuable such a museum can be in providing a varied fare in Nature study, functioning as a part of school and youth group work as well as with its own program. From the Pleasant Valley Wildlife Sanctuary in Lenox, Massachusetts, came its director, Alvah W. Sanborn, to discuss the possibilities and problems involved in the development and conduct of a trailside museum.

Sunday afternoon the Nature ramble around the Old World with Roger Tory Peterson proved a rare treat. Then a pioneer in putting Nature on the television screen, Norman D. Harris of the Boston Museum of Science, described the intricacies of this medium. His subject was "TV Is Worth the Agony," and he amply demonstrated the great possibilities of television in Nature Education. Dovetailing with this talk was an outstanding paper by Rea King of the National Audubon Society, who presented helpful guides to radio and television production in the Nature field. Raymond Gregg's inspiring talk, with slides, was devoted to the Nature interpretation work of the National Park Service, and was a highlight of the sessions. Dick Westwood, president of the American Nature Association and editor of *Nature Magazine*, closed the session with general observations on the evolution of Nature study thought and action.

C. Russell Mason, Executive Director of the Massachusetts Audubon Society, was in charge of the Monday afternoon session, which was a panel discussion of "An Approach to Nature Education for Everyone." Phoebe Arnold, John Brainerd, Edwin A. Mason and Mary Lela Grimes presented, respectively, helpful advice from the points of view of leadership, adult education, use of wildlife sanctuaries and public relations. This was a valuable how-to-do meeting packed with useful information.

Charles Mohr presided at the symposium session of Tuesday. This was devoted to ecology and its practical application, and brought forth varied thinking on both ecology and conservation.

December 30 provided a day made to order for the seventy-five field trippers who went on the trip planned by Russell Mason and led by Ruth P. Emery, Mary Lela Grimes, Charles Mohr, E. Laurence Palmer, Roger Tory Peterson, William G. Vinal and Dick Weaver. Starting with a black guillemot sighted at Folly Cove, the trippers built up a respectable bird list for the day. At Rockport more shore birds were added, and a harbor seal provided diversion. After lunch beside the road, the buses went on to Gloucester, then on the Parker River National Wildlife Refuge, where a flock of 45 Canada geese arrived in the midst of a description of this area. A lone blue goose was leading the Canadas. Capn' Bill Vinal took some of the trippers on an excursion to learn of the plant and animal communities of the refuge. Finally the group moved on to the Ipswich River Wildlife Sanctuary of the Massachusetts Audubon Society for coffee. Along the way a snowy owl on a stack of salt marsh hay stopped the buses.

British Yews

Four British yew trees from the famous Kew Gardens in London have been planted in Audubon Park in New Orleans in connection with the observance of the tenth anniversary of New Orleans' International House. The trees were flown over by BOAC and delivered to the British consul-general at New Orleans.

Product, Gadgets, etc.

One of the most dangerous infections is to get printer's ink flowing in one's veins, as the saying goes. Craftsmen Machinery Co., 575 Atlantic Avenue, Boston, Mass., promotes such infection through its little "Hobby Press," a complete outfit for introduction to printing that sells for $27.50. A booklet entitled "How to Print for Profit as a Hobby" is offered for twenty-five cents.

For winter-bound and armchair golfers Holiday Enterprises, Box 45, Wakefield Station, N. Y. 66, N. Y., offers a game entitled "Fun Golf." Price is one dollar.

Burke and James, 321 S. Wabash, Chicago, 4, Illinois, announces "Vue-File," a clever arrangement for filing photographic slides. Each mount holds twelve slides and costs 35 cents. A sample package of three mou ts for one dollar.

Eriez Manufacturing Company, Erie, Pa., announces the Eriez Recovery Magnet-tool, a new-type, pocket-sized magnet about the size of Dad's cigar. This gadget serves as a retriever for metallic things lost in places where the human arm can not penetrate. Price is $11.95.

The Polychemicals Department, E. I. duPont de Nemours & Co., Wilmington 98, Delaware, offers fishermen, free on request, a little 48-page booklet on spin fishing.

Taste buds are stimulated by a new cookbook entitled "Woman's Glory; The Kitchen" and containing recipes used in world-famous Slovenian cookery. Just reading it stimulates appetite. Two dollars from its editor, Mrs. Albina Novak, Dept. N-4, 1937 Cermak Road, Chicago 8, Illinois.

Leather Life is a new aerosol spray that revitalizes, mildew-proofs and waterproofs leather, and is specially made for shoes. A twelve-ounce can is enough to take care of the whole family's shoes and costs two dollars.

Sensitive Plant

The article, with pictures, about the sensitive plant in our August-September, 1953, issue proved of interest to many of our readers. One of these is George Wargo, P.O. Box 115, Streator, Illinois. He writes us that he has about a pound of seeds of this plant and that he will be glad to send some of the seed to any interested readers who will send him a stamped, self-addressed envelope in which he can mail them.

Canadian Films

Two new, 16mm films are now available on a free loan basis from the Canadian Travel Film Library, 1270 Avenue of the Americas, New York 20, N. Y. These are "Skyline Trail" and "Gift of the Glaciers." The Canadian Travel Film Library contains many other excellent films and a catalog of these will be sent on request to the address given above.

Contents Noted

In its report to the President of the United States, the President's Quetico-Superior Committee urged that early agreement on common administrative principles for the land use and management of this area be reached between Canada and the United States. It is pointed out that, through the years, there have been threats to this superb region, and some of these have caused some attrition of wilderness values. However, the Quetico-Superior wilderness canoe country comprises some 15,000 square miles of land and water area, including about 15,000 lakes and waterways, all constituting an incomparable recreational country. We have long hoped that the wishes of both the American Legion and the Canadian Legion might be realized, and that this area would be designated as a living memorial to all service men and women of both countries who have served as comrades in arms in both World Wars. It is encouraging that the Honorable Vincent Massey, Governor General of Canada and formerly chairman of the Canadian Quetico-Superior Committee, continues his deep interest in achieving the international agreement necessary.

Portland Oregon's Izaak Walton League chapter has jumped with emphasis into the fight against "the twin menace of litterbugs and vandalbugs." This, as a life member of the League, we applaud. However, we cannot avoid a cold shiver when we read one of the instructions given to cooperators with the chapter's program. It says: "Ask outdoor advertisers for free publicity." The slogan under which the chapter is battling is "Let's Keep America Beautiful. . . .' " If there is anything that has done more to make rural America less beautiful than the outdoor advertising business we would like to know what it is. Hence the shivers when we think of the inconsistency of a billboard that is littering and parasitizing the landscape urging people to stop littering and vandalizing.

Dr. E. Laurence Palmer, Director of Nature Education of the American Nature Association for the past twenty-five years, Director of Conservation Education of the National Wildlife Federation for the past three years, and Emeritus Professor at Cornell University, was one of the recipients of a Nash Conservation Award established by the Nash-Kelvinator Corporation. Ten plaques, with checks for $500, were presented to ten professional workers in the field of conservation of natural resources at a dinner in Washington, D. C. Also, ten medals were awarded to non-professionals in recognition of their acts of good citizenship in fostering better methods of conservation. Eph Palmer's award was made for his pioneering work in classroom and laboratory techniques in the teaching of conservation. This included recognition of the great contribution of the Cornell Rural School Leaflet, which he long edited. Also, more than 4000 students have come under his guidance in conservation, many of them doing graduate works on fellowships provided by the American Nature Association. Dr. Palmer was one of 729 nominees for this award.

George W. Mason, (left) president of Nash-Kelvinator Corporation, presents to Dr. E. Laurence Palmer the plaque emblematic of the Nash Conservation Award.

We learn with regret that the Yosemite Field School will not be in session this year at Yosemite National Park. Each year this school has trained Nature leaders, drawing upon the unique outdoor laboratory afforded by this National Park. Now this school appears to have been set aside in the course of a quite extensive reorganization of the National Park Service. Apparently this decision was reached because the school represented a drain on those park funds available for interpretive work, funds that are woefully inadequate and fail to recognize the vital importance of this part of the Service's public service, not only in Yosemite but in all of the National Parks. It is to be hoped that, when the reorganization has been achieved, the contribution of this school will be restudied, and that its omission from the 1954 program will be only an interlude and not a permanent policy.

President Eisenhower, in his State of the Union message, stated that "Part of our Nation's precious heritage is its natural resources." He urged legislation to strengthen agricultural conservation and up-stream flood prevention, and a better balance with major flood control structures in the down-stream areas. He promised recommendations for a uniform and consistent water resources policy, a revised public lands policy, and promised to "continue to protect and improve our national forests, parks, monuments and other natural and historical sites, as well as our fishery and wildlife resources."

R.W.W.

PHOTOGRAPH BY SEBASTIAN SOMMER, COURTESY
N. C. DEPT. OF CONSERVATION AND DEVELOPMENT

Azaleas, camellias and gardenias bloom on the banks of Greenfield Lake, native flowering shrubs provide a rich background and water lillies dot the surface of the water.

PHOTOGRAPH BY HUGH MORTON, COURTESY N. C. DEPT. OF CONSERVATION AND DEVELOPMENT

Wilmington, North Carolina, created its lovely Greenfield Lake and Park as a community enterprise during depression days and it is a focus of attraction in this North Carolina "Low Country."

North Carolina's "Low Country" Comes into Its Own

By CHARLOTTE HILTON GREEN

BIRDS, waters, azaleas, golf and a dynamic community spirit are a combination difficult to beat. This quintet of factors have put Wilmington, in southeastern North Carolina, on the map for a multitude of visitors, especially birders, throughout the year. And the high point is in the peak azalea season, in March, when the annual Azalea-Golf Festival is held, this year from March 25 to 28.

The birds, of course, have always been in this region, which is now challenging the Charleston, South Carolina, area as one of the leading places in the nation's Christmas bird census and other counts. Charleston, previously more fortunate in observers, has long been a Mecca for outstanding ornithologists. Such names as Catesby, Audubon, Bachman, Bartram, Coues and Brewster are a part of Charleston's bird history, as well as yesterday's Arthur T. Wayne and today's Alexander Sprunt, Jr., and E. Burnham Chamberlain, co-authors of *South Carolina Bird Life*, one of the best of the State bird books available to the students of birds.

But of North Carolina's "Low Country" region Olin S. Pettingill, Jr., author of *A Guide To Bird Finding East Of The Mississippi*, says: "Few bird finders are yet aware of the enormous potentialities in the Wilmington area. Within a 20-mile radius of this riverport city one has quick access to ocean front, lakes, marshes, swamplands, hardwood forests, pinelands, and open countrysides. . .The best bird-finding spot is Greenfield Park (250 acres) half of which is a pond, which serves as a sanctuary and winter haven for a small but varied number of waterbirds—Pied-billed grebes, Mallards, Black Ducks, Gadwalls, Baldpates, Pintails, Ring-necked Ducks, Lesser Scaup Ducks, Ruddy Ducks, and Coots. Good views of the birds can be obtained from a 5-mile drive that circles the pond."

In and around the lake are moss-draped cypresses, which make excellent cover for wintering waterfowl and nesting habitats for wood ducks. A host of song-

PHOTOGRAPH BY JOHN HEMMER, N. C. DEPT. OF CONSERVATION AND DEVELOPMENT

The Venus fly-trap, insect-eating plant, which Darwin called "the most wonderful plant in the world," is native only to southeastern North Carolina and a bit of South Carolina.

birds stop over during migration, and many of them nest in and about these trees, and in the shrubbery borders and pockets beyond and near the drive. Today, everything possible is being done to attract the birds; and conservation plays a leading role.

Around that lake a once beautiful area—the colonial plantation of Greenfields—had become a cheap and raucous amusement park and carnival center, with a section of it even a dump. In the beginning of the depression, to provide employment, relief work was tied in with developing the lake property, even before Federal relief was under way.

In 1925, the city of Wilmington had bought the property at about half its value, with the understanding that it was to become a community enterprise "and develop a better type of citizenship." Today spring is ushered in by the greening cypress trees, hundreds of them picturesquely draped with silvery gray Spanish moss, a perfect background for the brilliant, multicolored array of azaleas. Some of these are of immense size, some dwarfs, their colors from white to orange-scarlet, yellow, cream, pink, rose, rose-purple, crimson, salmon, umber, and lavender-lilac. There are hundreds of camellias and gardenias, and graceful, drooping wisterias.

Nor were the native flowering trees and shrubs overlooked in the landscaping of the five-mile drive that skirts the lake. There are thousands of flowering dogwoods, redbuds, crabapples, wild plums, bayberries, as well as the introduced flowering cherries, flowering quinces and flowering peaches. For an accent of green below the towering cypress trees, there are numerous magnolias, hollies, yaupons, and some of the evergreen shrubs of the nearby pocosins and bays. The blooming period begins in February and continues into and through the summer, when crepe myrtles splash their exotic color among the cool summer green of cypress and the holly, and the silvery gray of the hanging moss. Several kinds of water lilies glow like jewels on the surface of the dark waters.

What a place for the bird-watcher! Even better than the drive around the lake is a leisurely walk, on which one can slip down nearer the water, or hide in a pocket of shrubbery and catch a glimpse of the golden prothonotary warbler. Perhaps there is the flash of a cardinal, or of that almost unbelievable bird that looks like a bit of the tropics strayed north, the painted bunting. (The prothonotary and the bunting do not arrive until early April, however.)

On the northern side of the lake, and within a few feet of the road, is a bit of sunken garden dedicated to the Venus' fly-trap, that "botanical wonder" that Darwin called "the most wonderful plant in the world." In all the world, it is found only in this southeastern section of North Carolina, extending slightly beyond the border into South Carolina.

There is also an adjacent nursery, operated by the city and containing several hundred thousand azaleas, camellias, and other shrubs and flowers, which can be transplanted to the park as they become large enough.

Although this flower-bordered drive around the lake has been called one of the most beautiful scenic drives in the two Carolinas—or in the country, say some loyal Carolinians—the people of Wilmington object to the terms "Scenic Drive" or "Lakeside Drive." Many another place can have such a name! *They* prefer the name that grew out of their devotion, their vision, and their hard work and sacrifice *as a community*, and so they have named it *Community Drive*. There is an impressive bronze plaque, telling the story of how the drive was secured, and dedicating it "forever as a memorial to those from Wilmington and New Hanover County who have served their country in all its wars."

It was community effort, vision and determination that made the once beautiful colonial area into a shrine of beauty and interest. And here, too, is a story of human conservation as well as resources conservation

Faced with the unemployment problem it was asked: "What better employment than to develop the lake into an asset that the whole community would enjoy? Why not build and landscape a drive that would skirt the entire border of the lake?"

It was an idea that took fire. During a two-year period about $110,000 were subscribed, and at a time when dollars were mighty scarce. Rich and poor alike, employer and employee, contributed on the basis of a monthly payroll deduction. Sometimes it was a day's wages, or salary, for a month, donated to the project. What an example of civic sympathy and cooperation! The total amount subscribed at the time was devoted to cleaning, developing and planting the drive. Those sponsoring the idea gave largely of time and funds, and employment was furnished for some 1500 persons. Commissioner James E. L. Wade was in general charge, and among leading business men who gave freely of their time, effort and thought, says Louis T. Moore, chairman of the New Hanover Historical Commission, were J. Allen Taylor, F. A. Matthes, George E. Kidder, O. H. Shoemaker, and J. E. Becton, engineer. Carl B. Rehder played an important part in persuading the City Commissioners to purchase the property.

PHOTOGRAPH COURTESY N. C. DEPT. OF CONSERVATION AND DEVELOPMENT

Orton, a 10,000-acre colonial rice plantation on the Cape Fear River, is today famous for its gardens of azaleas and camellias, and visited by many during the annual Festival.

Wilmington, too, has its beautiful homes and gardens, especially Orton and Airlie, which compare favorably with the better-known Magnolia and Middleton Gardens of South Carolina. Orton, a 10,000-acre plantation on the Cape Fear River, dates from 1725, the old dikes of its once immense rice fields being still in existence. Today, besides the beautiful colonial white-pillared mansion, Orton is famous for its azaleas, camellias, and other flowers, the blooming period being from late January through April.

Clarendon Plantation, a colonial estate on the west bank of the Cape Fear, was named for the Earl of Clarendon, first of the lord proprietors, and cousin of King Charles II. Airlie, although not so old, is one of the outstanding landscaped estates of the Atlantic seaboard. During the Festival, Wilmington, with its beautiful harbor on the romantic and historical Cape Fear River also has a "Harbour Tour," on which visitors can see the grounds of many of the attractive homes and show places of this North Carolinian "Low Country."

We could speak of the Beauty Queens, who come each year from Hollywood to reign over the Azalea-Golf Festival, but we will skip the queens for the birds. Festival time finds some of the winter birds still there, and some of the early migrants arriving from the South.

In 1951 and 1952 the Christmas bird census, taken by members of the Wilmington Natural Science Club and their guests, has taken second place for species observed for the entire country. This group was organized in 1946 as the Wilmington Bird Club with eighteen charter members. Its founder and first president was Mrs. Cecil Appleberry. She is known as "Mrs. A." or "the indefatigable Edna" among the two-State Carolina Bird Club members, for she is a dynamic person whose passion for years has been to gain recognition, appreciation and protection for the resources and possibilities of her native Wilmington-Cape Fear region. Single-handed, she had put on Nature exhibits for schools and other groups. For several years, during the Festivals, the Wilmington Natural Science Club, with "Mrs. A." as the spark-plug, had a temporary Nature museum, which drew many enthusiastic visitors eager to learn something of the birds, the shells and sea-life, the plants and animals of that area.

A longtime dream of Mrs. Appleberry was to have a permanent Nature museum, and, in 1951, in an old greenhouse across the highway from Greenfield Lake and Park, and next door to a small zoo, the Greenfield Park Nature Museum came into being, sponsored by the club and under the jurisdiction of Arnold Peterson, Superintendent of Parks and Recreation. It was

opened in time for the 1951 Festival and attracted thousands of visitors; 15,000 during the first month. Exhibits were wisely limited to the Wilmington and Cape Fear region.

After two years the museum was a victim of a cut in the Parks and Recreation budget. Members of the Club will open it for the 1954 Festival with volunteer help, if necessary.

Throughout the years Mrs. Appleberry has introduced the natural history of the region to schools, Scouts, 4-H clubs, camps and other groups of young people, as well as to adults and leaders. Her interest and enthusiasm has made her many friends among naturalists. When Edwin Way Teale was taking the trip that resulted in his *North With The Spring*, he spent a day with members of the Carolina Bird Club. In his book he refers to "Mrs. A." as "one of the most enthusiastic and capable amateur naturalists we met on the trip .... she guided us down byways of the Cape Fear region."

PHOTOGRAPH BY HENRY H. LUDWIG

Mrs. Cecil Appleberry, who has been a leader in bringing the great Nature attractions of her beloved Wilmington-Cape Fear country to the attention of many, here works with some Brownie Scouts.

Mrs. Appleberry has always been a leader of young people, especially boys. During the war she was a volunteer hostess of the Woodrow Wilson Hut, and still keeps in touch with hundreds of "her boys." In the Carolina Bird Club another group of "Mrs. A's boys" is credited with having helped put the Wilmington area into second place in the Christmas bird censuses. For several years some of those boys—John Carr, Bill Craft, Larry Crawford, Bob Holmes III, Will Hon, Gregor Rohwer, Sandy McCulloch, Ernest Mitchell, Oscar Paris, and John Trott, Jr.—took part in the Christmas census. Some of them still do, although they are grown and scattered now. Some have been in the armed services, some are married and have children, but they still treasure the close bond of being "some of Mrs. A's boys."

Those particular boys were interested in birds when they first met Mrs. Appleberry, but she has also interested many others, not only in birds, but in other phases of natural science. With two sons of her own, her theory is: "A busy, interested child does not have time to get into much trouble."

Yes, North Carolina's "Low Country" is coming into its own. It has everything—enthusiastic leaders, beautiful colonial homes, wonderful gardens, dramatic history, and pirate lore. Blackbeard is believed to have buried some of his ill-gotten treasure in nearby Topsail Island, and there were even two lady pirates, Anne Bonney, and the more petite and beautiful Clarissa Vantresse, who married a Spanish Don, captain of a vessel she had captured!

Winter storms sometimes bring rare birds down from the North, and tropical hurricanes occasionally blow in rare birds of the Tropics. Besides native wild flowers, one should not overlook the nearby savannahs and pocosins, believed by some scientists to be the result of a giant meteoric swarm that scarred the region aeons ago. And foreign botanists come from afar to see the Burgaw flowering savannah.

Nor should one overlook the numerous ancient and stately live oaks, one of which is credited with being the world's largest living Christmas tree, with a spread of 110 feet and a height of 75 feet. Decked out in a thousand multi-colored lights amongst the hanging moss, the tree, estimated to be 300 years old, is the center of a Christmas Eve service, the illumination being continued through to the New Year to celebrate the season.

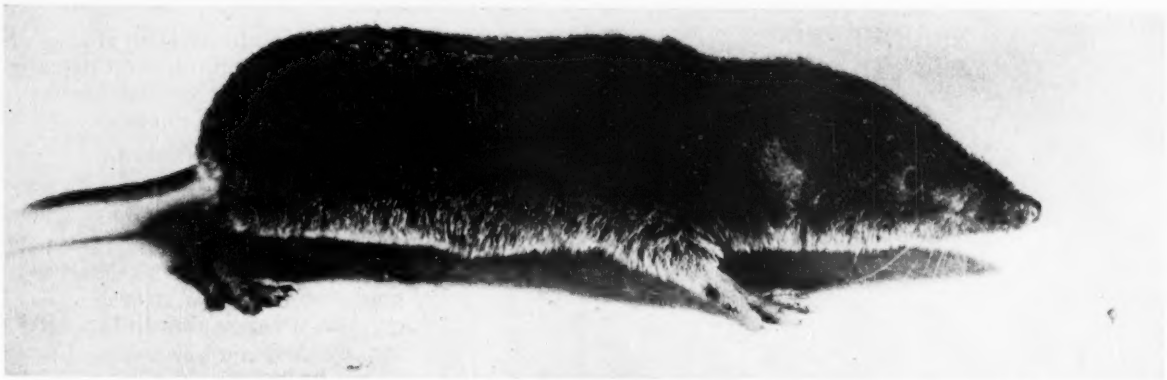
Truly, in any season, the Wilmington area has much to offer the outdoor enthusiast and lover of beauty.

Passing Storm

By ELEANOR B. STEINER

A Chinese-lantern moon sailed in the sky,
While overhead the clouds went scuttling by;
And one, more black and bolder than the rest,
Shot lightning darts at her and did his best
To hide her glow.

But at this eery, frightening sound
There came another on policeman-round,
Whose lusty, gusty breath bade him begone
And leave the lan,ern-moon
To greet the dawn.



This portrait of a lesser short-tailed shrew, *Cryptotis parva*, shows it almost three times larger than it actually is, and is thus enlarged to show the animal better than would be possible in natural size. This shrew has the shortest total length of any North American mammal, and is a close rival of the least long-tailed shrew and a tiny African mouse for claim to being the smallest adult mammal in the world.

Shrews Is Shrews

By ERNEST P. WALKER

Assistant Director, National Zoological Park

Photographs by the Author

THE lesser short-tailed shrew has the shortest total length of any North American mammal. Indeed, it is a close rival of the least long-tailed shrew, *Microsorex*, of North America, and a tiny mouse, *Mus minutus*, of Africa for the distinction of being the smallest adult mammal in the world.

The lesser short-tailed inhabits the eastern half of the United States, but is little known and generally considered to be rare. I suspect that there may be more of them than is supposed, but they are very elusive and so tiny and weak that they do not always spring traps that they may enter.

These, like other shrews, have the reputation of dying soon after capture, so I had no hope that I might be able to keep one. A friend who had one of these little creatures asked me if I wanted it to photograph and lost no time in bringing it to me. I was so confident that the shrew's moments were numbered that I had my photographic apparatus set up and ready for action.

However, my diminutive subject survived the photographing, and then was put in a jardiniere with leaf mold, leaves, nest box and a shallow dish of water. Then I began my favorite practice of offering a new animal a variety of foods to learn what might be suitable substitutes for the foods obtained in the wild. My guest continued to survive and thrive.

About a year later, friends gave me two more of these shrews. This pair began a story that puts Ellis Butler's classic *Pigs Is Pigs* to shame.

After the parents had been with me eighty days, it was a great thrill to find five babies in the nest. This was the beginning of a real *Cryptotis* colony. Here is what the original pair accomplished: March 20, 1949, 5 young; April 17, 1949, 2 young; July 2, 1949, 4 young; July 26, 1949, 5 young; August 20, 1949, 4 young; September 13, 1949, 6 young; October 11, 1949, 5 young; November 3, 1949, 6 young; November 27, 1949, 6 young; December 18, 1949, 5 young; January 5, 1950, 5 young; January 20, 1950, 5 young; February 13, 1950, 4 young; March 12, 1950, 4 young. A total of 66.

The gestation period indicated by young born to shrews reared in captivity is not more

Mother shrew with two babies that are one day old and in a nest among violets and dandelions.

A quartet of lesser short-tailed shrews at the tender age of two days, the ruler giving an idea of their diminutive size.

than sixteen days, and may be as short as twelve days. There were four instances in which a female gave birth, raised her young and gave birth to another litter in twenty-four days.

There were three other instances in which the elapsed time between litters appeared to be twenty-two and twenty-three days, but this apparently shorter period may be because I failed to detect the exact day the earlier litter was born. When something happens to a litter before it is weaned the period between litters is usually shortened.

The first litter of young is born when the parents are no more than three months of age. In fact, I suspect that in many instances young may be born when the parents are considerably younger.

Adult short-tailed shrews that I have weighed ranged from 54.4 grains, for one just caught and that had perhaps not attained full size, to a maximum of 77 grains for the same one when it had been in captivity about seven months. During this time it had been fed well, had not worked hard to obtain a living and was probably overweight. Over a period of about a year its weight ranged between these two figures. The average weight is slightly less than that of a five-cent coin.

A baby book for my *Cryptotis* would read much as follows:

1st day: Pale, clear, translucent pink. One of family A weighed 16 grs.; those of another family weighed 15 grs. each. (Note: Four very small babies of second generation weighed 5 grs. each, but did not survive to permit a complete record.)

2nd day: Pink slightly darkened with very faint dusky or bluish on back. All five appear to be larger, but weigh only 16 grains each, the same as the day before. (Note: One from a second generation weighed 10 grains.)

3rd day: Pink definitely darkened by dusky. Family A: Weight of one, 25 grains. (Note: One family of second generation weighed only 12 grains each. Small.)

5th day: Dusky predominates, strongest on upper parts. One weighed 36 grains. Five weighed ¼ oz. 63 grs. average of 34+.

7th day: Pink obliterated above by short fur.

8th day: Almost fully furred. Weight 50 grs.

9th day: Well furred but eyes not open. One weighed ¼ oz. and 29 grains.

14th day: Eyes open. Fully grown and active.

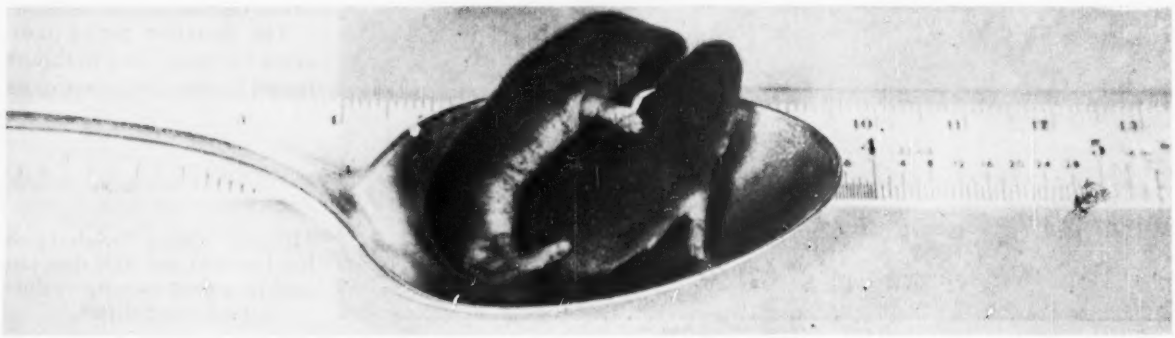
These studies furnish material for interesting theorizing. First we might consider the potential or theoretical rate of increase of the species. To be conservative, let us assume that an original pair in the wild in such a climate as Washington, D. C., would breed only during April to September inclusive, and that they would have only one family of four during each of these months.

Then let us assume that the twelve young produced in the months of April, May and June constitute six pairs, each of which produces only one litter of four each, and that none of the young born from July to September produces young that year. At the close of the breeding season there are the original pair of two; the first generation of twenty-four and the second generation of twenty-four. The total is fifty.

Certainly this calculation is conservative, for it allows for only small litters, just one litter from each pair of the first half of the season of the first generation, and does not contemplate the possibility of the second generation producing a third generation.

We will leave it to the mathematicians to calculate

When they reached the age of seven days and had acquired some fur these little shrews fitted neatly into a teaspoon.



These five young *Cryptotis* are now nine days old and they weigh about fifty-two grains each. Their eyes are still closed but will open in about three days.

how long it would take for lesser short-tailed shrews to overflow all parts of the Americas if their increase was not controlled by a mortality rate proportional to their breeding rate, as with other living things.

It appears probable that lesser short-tailed shrews may live two years, and breed during two seasons. If so, our calculations would need to be revised upwards to account for the multiplication of all during the second year and some in addition for increase of their progeny that season. However, if we stop our theorizing with one season of breeding, or one full year, it is obvious that forty-eight must die from various natural causes if the species is only to hold its own.

If *Cryptotis* and *Blarina* were somewhat larger they might be classed as dangerous animals, for both have poisonous saliva that is usually fatal to insects and their other small prey. The poison is related to that of the cobras in that it acts on the nervous system. It is, however, delivered in small quantities, and is not injected through fangs, so that it is little more than an interesting phenomenon to humans. My shrews have bitten me many times but usually they could not break through my skin. Occasionally they pierced the skin, and once a *Cryptotis* nipped me on the back of the hand and put in some poison. The results were like a mild bee sting or small spider bite.

On another occasion, when photographing *Cryptotis*, it chewed at the back of my hand from time to time for several minutes at a time when I did not want to move my hand. It lacerated the skin slightly over a space about an inch square but apparently did not get any poison into the breaks in the skin.

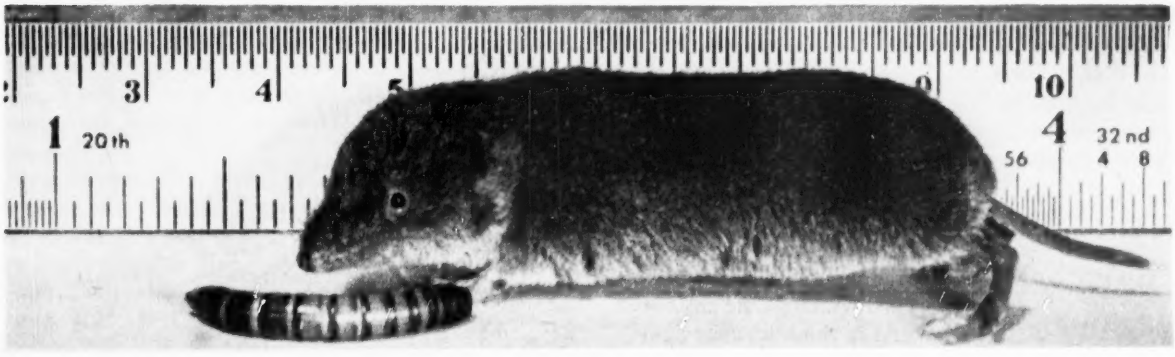
When this shrew attacks an earthworm that may weigh as much or more than the animal itself, the effect of the poison is clearly evident. The shrew gives the earthworm from three to five quick bites along its body, then runs about nearby for five to ten seconds. In the meantime the worm becomes limp, and large lumps or swellings appear. The shrew then returns and eats the worm, which does not even struggle.

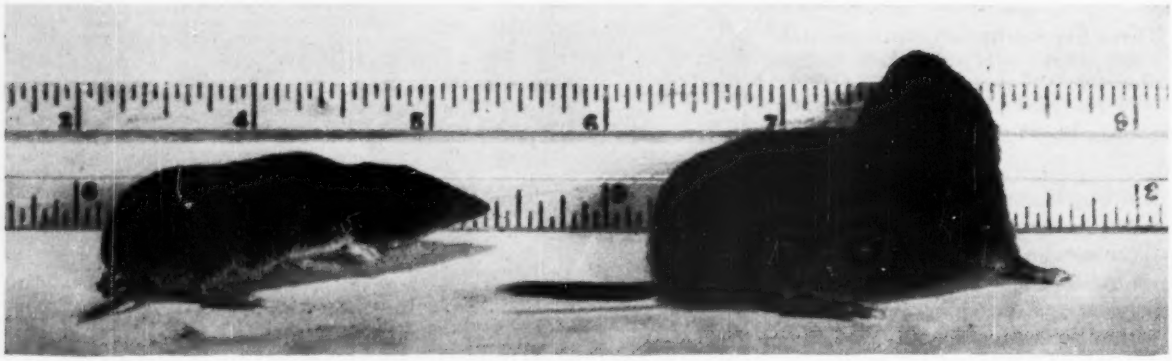
Many zoologists have supposed that shrews must eat almost continually to survive. Since most of those that are captured die immediately after being taken, I suspect this is from shock. To prevent this I suggest having the trap provided with a nest chamber with some soil and dead leaves in which the captive can hide and feel somewhat secure. A supply of food in the nest chamber might also help, if the trap is not to be visited soon after capture. Transport them in a can, or box, or the trap, the container being supplied with soil and leaves.

My captive *Cryptotis* and *Blarina* were kept in such varied containers as an aquarium about twenty by ten inches and ten inches deep; tin cans about twelve inches in diameter and six to eight inches deep; a jardiniere about nine inches in diameter and nine inches deep. All were provided with about two inches of leaf mold and leaves in the bottom, a nest with dry leaves for nest material, and an inclined disc exercise wheel.

One lesser short-tailed shrew that I had for some time before others were obtained was maintained in good condition, but gained somewhat when it was fed

***Cryptotis* about twice natural size and a mealworm, which it fancies in its diet.**





At the left is the lesser short-tailed shrew and at the right the greater short-tailed shrew, *Blarina brevicauda*. Both are adults and the difference in size is marked.

morning and evening. Each feeding consisted of two earthworms, which averaged forty to fifty grains each, and seven to ten mealworms that averaged two grains each. Bear in mind that when the earth and other foreign material in the body of the earthworm was removed there was little meat remaining and that it had a high water content. This quantity of food appeared to be excessive, and later the little fellow increased in weight from sixty-two grains to seventy-one grains during a fourteen-day period, when it received only five grains of mealworms and thirteen grains of earthworms twice a day, or a total of thirty-six grains daily.

I found that the shrews will eat a considerable variety of food, which simplifies the problem of feeding them. Apparently they can thrive on the food mixture I developed for bats. When this was given they frequently took no other food. However, they enjoy insects, raw or cooked meat, worms, shrimp, lobster, hard-boiled egg yolk, dry rolled oats, meats of English walnuts, peanuts, pecans, grapes, raisins, bananas, apples and oranges. Some took bits of lettuce or cabbage.

For those who may be hosts to bats, shrews, small monkeys, small carnivores, and the like, here is my formula of a food mixture:

One yolk of hard-boiled egg; approximately an equal amount of rather dry cottage cheese; approximately an equal amount of ripe banana; approximately an equal amount of mealworms; six drops of Jeculin; six drops of wheat germ oil; three grains of Theragram.

Make up the mixture with a mortar and pestle. If the wheat germ oil is in 3 minim capsules put in two, also add the Theragram, which is a yellowish paste. Add a few drops of water to soften the gelatin of the wheat germ oil capsules and to dissolve the Theragram. Then put in the other ingredients and grind all together with the pestle until a paste is formed with the chitin of the worms scattered through it.

The mealworms, *Tenebrio molitor*, are the same or similar to those that get into cereals. Cultures of them can be maintained in bran or cornmeal with the addition of banana peelings, slices of raw potato and occasionally light sprinklings of water to moisten the bran or cornmeal very slightly but not enough to cause it to form lumps or to mildew.

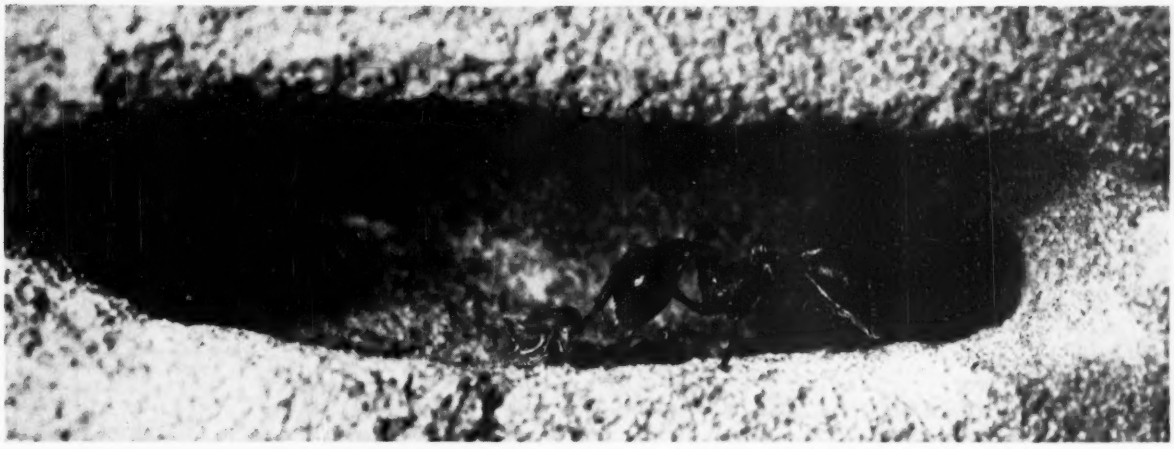
A person who has not met both *Cryptotis parva* and *Blarina* may wonder if he can distinguish between them with certainty. There is no difficulty in recognizing them. *Blarina* is a giant in comparison to *Cryptotis*, and the coloration of *Blarina* is definitely a dark, lead gray at all times. *Cryptotis* is tiny in comparison and the coloration is a silvery brownish-gray, not lead color, lightest, sometimes almost white, on the under parts. The summer coat is definitely more brownish than the winter coat.

Specimens that I raised were sent to London; Santiago, Chile; San Francisco; Chicago, and were placed on exhibition in the U. S. National Zoological Park. Finally I liberated twenty-three at various places about the National Zoological Park grounds.

City Trees

By JOHN D. ENGLE, JR.

Among things that arouse my pity
Are trees that grow within a city.
The city dweller seems to know
Exactly how a tree should grow.
His trees must bow unto the law
Of ax and pruning knife and saw.
He seems to think it is not right
For trees to reach a certain height.
And trees that grow too close or tall
Must either cease to grow or fall. . .
Though summer time puts up a screen
So that their wounds cannot be seen,
Autumn strips them with a breeze,
Revealing them as amputees.



A tiny ant-loving cricket nibbles at a harvester ant's leg. Ants allow these "guests" to live with them much as we welcome cats and dogs.

Ant House Guests, Good and Bad

By ROSS E. HUTCHINS

IN THE dim beginnings of human history man lived much like the other beasts of the fields. He had no permanent home, and each night might find him bedded down in a different spot. As time passed he changed his way of life and adopted a more settled existence in caves and other shelters. Soon family groups developed, and food could be obtained or grown more easily by community effort. Now there were more abundant leavings from the feasts and there were storehouses for grains. This food began, at an early date, to attract other creatures, which gathered about to share man's bounty.

At night, the mice and the rats crept out of their haunts in darkness to gnaw at the bones that the caveman had tossed away from his evening meal, and cockroaches emerged from their hidden crevices and fed upon the leavings. And so primitive man soon gathered about him an array of camp-followers that had found an easy way of life. Then, too, the caveman domesticated the wolf, and the wild wolf became his domestic dog, aiding him in the chase and sharing the comforts of his cave at night.

As time passed, other races of men in other lands domesticated other wild creatures. Down the long corridors of time all these once-wild animals have followed man in his travels; sharing his home, and the crumbs from his table, or supplying him with essential foods.

Next to man, the insects have developed the most complex form of social existence. It is even possible that certain ants and bees have perfected more highly developed societies than their human neighbors. Be this as it may, these interesting insects have been living a settled life in teeming communities for a million years or so. Thus, perhaps, it is not surprising to learn that they, too, have many kinds of camp-followers that live with them.

These camp-followers include many kinds, and their relationship to their hosts ranges from outright robbery to that of guests treated with lavish attention. In more than one instance these "guests" bite the "hands" that feed them. These creatures are always uninvited, but this does not mean that they are unwelcome in the teeming ant cities.

For example, there are several species of tiny crickets that make their homes in the nests of various ants. They are very small, in fact they are only "knee-high" to the ants they live with. Anyone can observe these interesting little creatures if he has the patience carefully to excavate an ant nest.

These little crickets are called "myrmecophiles," which in plain English means "ant loving." Actually this seems to characterize their relationship with their ant hosts, and they continually nibble and lick the legs and bodies of the ants just as the ants do each other. It is amusing to watch one of these minute guests acting like an affectionate dog licking the hand of its human master. But, after a time, the ant grows tired of the attentions it is receiving and turns upon the cricket with snapping jaws, like an old dog annoyed by a puppy. When this occurs the strong, jumping legs of the cricket save it from being killed. In general the crickets live easy lives in the security of the busy ant colony. They feed upon any food left lying about, and lay their eggs and rear their young in the dark passages. It is an interesting fact that these diminutive crickets have been making their homes with ants for so long that they cannot live anywhere else.

In many ant nests there lives another kind of house guest—the spring-tails, Collembola. They are tiny, hairy creatures even smaller than the crickets. They scurry about in the dark corners of the ant nest almost completely ignored by the rightful inhabitants. Under a hand-lens they resemble furry cats, and this similarity is even more striking if one observes them closely.

Spring-tails, or Collembola, live in some ant colonies in large numbers, feeding upon refuse or food stores. Some other "guests" are actually fifth-columnists.

On one occasion the writer was watching a colony of harvester ants. One of these seed-gathering ants was observed to carry a winged elm seed into the nest entrance. A few minutes later the nest was broken open and in one of the passages, only an inch or so from the entrance, lay the elm seed almost covered with Collembola.

But the ants are often far too tolerant of these uninvited guests, because some of these "star boarders" behave in a most ungrateful manner. Certain rove beetles have found ant colonies good places in which to live, and here they not only kill and devour injured ants, but also feed upon the young ants. If the angry worker ants pursue them they behave in a skunk-like fashion, ejecting an offensive fluid. Groups of these rove beetles roam the dark passages of the ant nest like wolf packs and attack returning worker ants carrying food to the colony. When such an ant is killed, the beetles then commence fighting among themselves over the remains, like miniature jackals.

It is a strange and interesting fact that many of the house guests that live with ants have finally come to look like the ants themselves. An example is the small beetle that lives with the army ants. These interesting ants are nomadic, never staying long in one place. They are also blind, which is further amazing, considering the fact that they travel constantly. These beetles resemble the ants in general form and, since the ants are blind, they are accepted without argument. They follow the ants on their foraging raids and share in the spoils of the chase.

There are several of these house guests that ingratiate themselves into the ants' confidence by secreting a substance that the ants like. One of these is a rove beetle that is cared for by the ants and treated with great affection. The tragic thing about this relationship, however, is that the care is one-sided. The ants crave so much the material that the beetles secrete and lavish such care on the guests, that their own young are neglected. The result is that these neglected young develop a strange type of malnutrition that results in freakish adult ants.

Perhaps the strangest of all these "guests," actually fifth-columnists, is a bug in Java that is associated with ants. This insect waits beside the trails of foraging ants. When an ant comes along the bug secretes a material that the ant likes and the ant begins licking it all over. The bug is cooperative and makes no effort to escape. But there is a reason for this cooperative attitude, because the ant soon becomes paralyzed by the substance that the bug secreted, and the bug now forsakes its role as a friend and benefactor and sucks out the life blood of the unfortunate ant.

Thus ants, too, have their fifth columnists, their chislers and hangers-on, which toil not, but live happily upon the fruits of honest labor. Perhaps if King Solomon had had a hand lens he would have seen an additional reason for considering the way of the ant, for he would have found that there are undesirables in the nests of the industrious ants, just as there are in human society.

The Versatile Hau Tree

By N. W. HARRIS

At the Halekulani Hotel on Waikiki Beach captive hau trees provide a canopy on the terrace for hotel guests, shielding them from gentle rains.

ON TROPICAL islands, where warm sun and soft rain are on Nature's payroll twelve months of the year, there is little need for a green thumb. All vegetation is so fantastically lush, whether on rocky mountain ledge or sandy seashore, that Nature can be charmingly disrespectful of man's educated skill as a cultivator. But in the case of one tree, the hau, or *Hibiscus tiliaceus*, such independence is regrettable. Left to the mercy of the sun and rain, and, most particularly, the winds, the hau grows, there is no doubt of that, but in so doing it often gets itself into quite a mess.

Although in some places the hau will grow naturally into a gnarled but sturdy tree, it more often appears as a somewhat garbled forest specimen. Then, instead of standing proudly and growing gracefully from an erect central trunk, it prostrates itself and gives the wind free rein with its supple brown branches. Being a soft-wooded, quick-growing tree like the willow, these branches sprout irresponsibly from the ground and then, encouraged and plagued by the elements, they begin their vague and tormented pattern of growth. The hau makes a brave and graceful beginning, arching skyward for four, five or, perhaps six feet. But then the softness of the wood and the strength of the winds soon cause them to bend earthward, where they strike root in the soil before curving upward again.

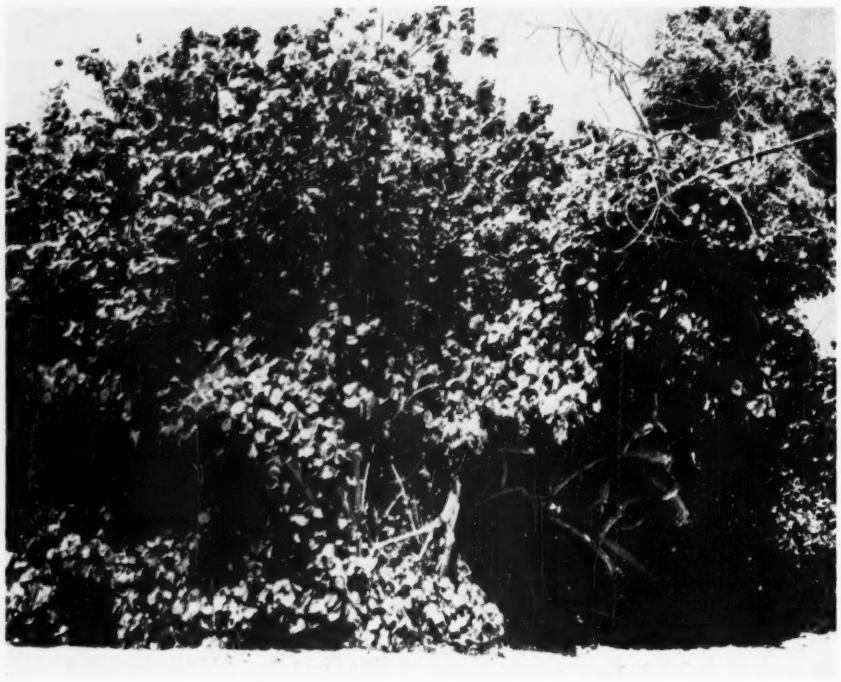
For this flagrant fertility, Nature appears to have provided no system of checks and balances, and certainly no laws of traffic. The pliant branches of a single hau grow rapidly over a considerable area, and as each branch seeks a right-of-way for its growth, it meets and grapples others and they soon become hopelessly entangled. In this matted condition, the tree continues to grow, adding tier after tier of scrambled branches until it is impossible to tell where one tree starts and another ends. This chaotic mass of branches is not always immediately apparent to a passerby, however, for a dense foliage of heart-shaped, leathery leaves often spreads like an all-enveloping blanket over the entire perimeter of the tree, making it look like a huge, rambling bush.

In spite of its natural jungle wildness, however, the hau is responsive to the pruning and care of a cultivator. Properly trained, it can develop a strong, stocky trunk and gradually the layers of coiled branches may be lifted from the ground and propped up to form a charming canopy of foliage and a fine protective shade.

An excellent example of the "capture" of rampant hau trees is to be found at the Halekulani Hotel on Waikiki Beach. There several huge trees, securely braced by an iron network of posts and girders, provide a uniquely tropical "roof" for the hotel's ocean terrace. So dense is the lattice work of branches and leaves that it is possible for guests to continue their dining on the lanai, even during a gentle rain. The trees are now more than a century old and are believed to have been planted by native Hawaiians, who were the first owners of small lots along the now priceless Waikiki Beach property.

When the first hotel was opened on that site about 1907, it was called "The Hau Tree," and it was then that the training of the trees into a shady arbor began. The lifting of the trees' branches was a long process for, after each propping operation, they had to be allowed time for growth and readjustment. By 1933 the training period was over and the permanent framework of iron was built to support the massive canopy. Now about once a year the trees must be cut back and the luxuriant foliage trimmed so that residents of the hotel can see the ocean from their rooms. According to the hotel owners, as well as tourists, it would be difficult to imagine the Halekulani without the hau trees. Their unique charm is reflected in every phase of the hotel's operation, and there is little doubt that, in throwing bountiful shade over the Coral Lanai, they have also bountifully enriched the hotel's coffers.

A little farther down Waikiki Beach, at the spot where the first king of the Hawaiian Islands, Kamehameha the Great, landed his war canoes to conquer Oahu, jacked-up hau trees stand gracefully in line beside the world famous Outrigger Canoe Club building.



In its natural state, the soft-wooded hau, its branches spreading and taking root, rapidly grows itself into quite a jumbled mess.

And the hau rightfully belongs near outrigger canoes for the warriors of old Hawaii took advantage of the natural curvature of the hau branches in making the outrigger supports for their canoes.

The hau is most frequently found along sandy seashores. On the side of Oahu opposite from Waikiki Beach, the little village of Hauula (meaning red hau) was so named because of the large number of arbored hau trees that shed deep red blossoms along its ocean front.

The hau, as its scientific name indicates, is a member of the hibiscus family. This is quite apparent when you look at the bloom that the tree produces. Clustered at the tip end of the branches is a small, bright, cup-like flower, and, like the famous hibiscus, each blossom has but one day of life. Reflecting the morning sun at dawn, the bloom darkens, as the day fades, to dull orange or salmon. Finally, deep red in tone, it falls from the tree. In olden times, the natives of Hawaii considered that these flowers had medicinal qualities and used them to make laxatives. The tree bears a fruiting capsule about one inch long, shaped with five valves and containing three seeds. This seed is meant for the reproduction of hau trees only, for it does not cross with other relatives among the different hibiscus.

The natives of the South seas were also ingenious enough to discover that the fiber of the inner bark of the branches was excellent for making ropes, net bags and tapa cloth. In Tahiti, where the tree is called the fau or purau, the leaves were used as plates and oven covers, and in Samoa the bark is still used for straining the native drink, ava.

There is a legend of old Hawaii that the hau is the visible form of the manoa, or the wind that blows out to the sea from the mountains. A glance at the twisted branches seems to support the legend, for these could easily be the tangible tracings of a carefree and playful wind. But, unlike the wild winds, the tree is never secure in its freedom, for if man puts his mind to it and uses his cultivating skill, he can capture the hau.

Catoctin Spring Days

By HARRY C. YORK

High Knob, Braddock, Gum Spring blue,
Indian Spring, Sandy Hole, view on view,
Blue Ridge Mountain, mystic haze,
Prone Catoctin, languorous days!

Whispering sunsets, beckoning nooks,
Sun-flecked cloud-lands, gem-set brooks,
Mottled slopes with earth smells rife,
Glade and bud a-tug with life.

Drifting down warm breaths of air,
Caught by lilt of bird,
Lifted out of space and time
By a wood-song heard.

Now reclined on noon-drenched peak,
Senses steeped with feeling,
Under us, and far and wide
Vistas God-revealing.

Fields grow purple, hillocks nod,
Pines are black, and o'er, a crescent;
Slumbering cadence seeps from sod,
Wrapped are we in worlds quiescent.

"One of the unfortunate phases of the Communist regime in China is the effort to do away with every vestige of ancient folklore," writes the author of this article, who lived and taught for many years in China. Here she presents a sampling of that folklore that Communist authority is doing its best to suppress.

★

Chinese Stories in the Sky

By MABEL IRENE HUGGINS

★

Ugly enough to frighten an emperor, K'uei Hsing is here portrayed as the decoration on a porcelain brush-pen jar. In his right hand he grasps a large Chinese writing brush. The Big Dipper is in evidence in the sky. Tao Kuang period (A.D. 1821-1850). Author's Collection.

WE DO not know when in man's childhood on the earth his wonderings about the heavenly bodies began to crystallize into myths and legends. Amongst all such stories, those from Greece and Rome have entered into the background of our culture. Those from China, although unfamiliar, are just as worthy of consideration.

During the Empire, offerings were made to the sun on the morning of the spring equinox. In recent centuries these ceremonies were performed by the Emperor, or his deputies, at the Altar of the Sun, built in A.D. 1530 outside the east wall of Peking. But even then the worship of the sun was nothing new, for as far back as 259 B.C. the "Lord of the Sun" was one of the gods worshipped by the Emperor of that day.

A sun legend, which must have been a favorite during the Han dynasty, (202 B.C.—A.D. 220) was portrayed in stone carvings of that period. It was believed that the legendary *Fu-sang* tree stood on the eastern horizon, and to its branches came the ten solar crows. Each morning, in turn, one of these three-legged birds took flight and made its way across the arc of the heavens. At the close of the day it descended over the western horizon to appear next morning on a branch of the *Fu-sang* tree in readiness for "Operation Flight" ten days later. But unfortunately there came a day when all ten took flight together, with results that were far more disastrous than a Kansas drought. The Emperor became so enraged over the parched and burnt-up earth that he ordered his expert archer to shoot nine of the crows. Consequently, since then we have been left with only one sun.

In the stone carvings of the Han dynasty the crow has much the appearance of a peace dove, but in the solar symbol of an imperial ceremonial robe dating A.D. 1736-1795 its likeness shows a remarkable resemblance to a barnyard rooster.

From early times the moon, also, has attracted the attention of the Chinese, who have populated it with several immortals, claimants for our interest. Hou I, the archer who shot down the nine extra suns, received from Hsi Wang Mu, the Queen Mother of the Western Paradise, a pill of immortality—a reward for his exploits. He was urged to delay eating the pill until he made some suitable preparation for assuming the life of an immortal, so he hid it on a rafter. However, his beautiful wife, Ch'ang O, discovered it while Hou I was away from home. Surprised by his unexpected return, she gulped it down. Suddenly, she found that she could fly. Away she went like a leaf swept upward by a gale. Her husband took after her with great speed, but lost out in the chase, while she obtained

The Rabbit in the Moon, with mortar and pestle, was one of the twelve symbols used on imperial ceremonial robes. Ch'ien Lung period (A.D. 1736-1795). Another of the twelve symbols was the three-legged solar crow. Ch'ien Lung period (A.D. 1736-1795). Photographs courtesy The Minneapolis Institute of Arts.

sanctuary on the moon. In a fit of coughing, she spat up the outer covering of the pill, and forthwith she was changed into the three-legged toad, which, to this day, may be seen on the face of the moon.

Another lunar inhabitant is Wu Kang, whose never-ending task is chopping away at the trunk of a cassia tree. On earth he had been a student of fairies, but for certain mistakes he was banished to the moon and sentenced to hard labor. Indeed, it is hard labor, because as fast as he makes the chips fly, just so fast does the trunk of the cassia tree heal over. Like all other inhabitants of the moon, the cassia tree is immortal. In bygone days it held a place of special significance in the life of scholars who, when they attained the second literary degree, were said to have plucked "a cassia flower from the topmost branch by the Pavilions of the Moon." It is believed that at different times seeds from the cassia trees on the moon have fallen to earth like rain. Some of these were planted by some monks at a monastery at Hangchow and the resultant twenty-five trees were the start for all the cassia trees that now grow on the earth.

Whereas Wu Kang was sent to the moon as a punishment, the Jade Rabbit acquired his residence there as a reward of merit. According to the Buddhist story, a rabbit in the woods sacrificed its body to provide food for Buddha, who was disguised as a hungry pilgrim crying for help. Buddha approved so heartily of the rabbit's behavior that he allowed it the privilege of having its likeness on the face of the moon. There, with mortar and pestle, it spends its time standing under a cassia tree, working at the task of grinding up immortality pills.

The Mid-Autumn Festival, one of the most important dates in the Chinese year, comes on the fifteenth of the eighth lunar month—our "harvest moon." At this time there are special acts of worship carried out by the women of the household. There is the exchange of special gifts—fruit, mooncakes, or figures of the Jade Rabbit. This is a time of feasting and special festivities; a time for family reunions and the strengthening of family ties. There is special food—especially the celebrated mooncakes upon which are imprinted the famous rabbit-under-the-cassia-tree design. In fact, the Jade Rabbit takes the center of the stage at this festival.

Another ancient story tells that long, long ago two girls lived on the moon and their brother inhabited the sun. In those times people gazed at the moon just as they have in modern eras. Finally, the girls, having become greatly embarrassed by being stared at so much, suggested to their brother that he exchange places with them. It was his opinion that more people were out by day than by night so he questioned whether they would better their situation. They assured him that they would be able to manage, so, good brother that he was, he gave in to their wishes. Ever since, when people begin to stare at them, the girls prick the gazers' eyes with their seventy-two sharp-pointed embroidery needles, which are the bright and piercing rays of the sun.

The Old Man of the Moon is another moon-dweller. He is the God of Marriage, and it is his business to manage the marital destinies of all people. He keeps a book in which he records all such matters. Moreover, with an invisible red cord he ties together the feet of future husbands and wives. In the shrine of the God of Marriage, which used to be in Peking, he

On this porcelain plate we see the Old Man of the Northern Bushel—peach in hand—and the Old Man of the Southern Bushel, both under a pine tree. In the sky sitting on a cloud is K'uei Hsing. Hsien Feng period (A.D. 1851-1861). Author's collection.

was represented as an old, bewhiskered gentleman. In front of him were festoons of red threads, which were carried away by friends or relatives of persons who failed to find suitable mates. The threads, if secretly placed in the rooms of bachelors, and if accidentally broken, brought good luck and brides.

In our summer skies all of us recognize Corona Borealis, the beautiful crown of stars that seems to have one star missing from the circle. Upon that missing one hinges the Chinese legendary tale about this constellation. To the Chinese these stars were not a crown but rather the curb of the Gently Flowing Heavenly Well. Long ago, so the story goes, the Queen Mother of the Western Paradise went to the heavenly well for a pail of water. Arriving at the curb, she stubbed her royal toe on one of the golden, glazed curb-bricks and knocked it out of place. Down, down, down it fell and became irretrievably lost. None has ever replaced it, so the curb still appears as a broken circle.

The stars we call Vega and Altair feature in a well-known Chinese legend. In it they are named Chih Nu, the Spinning-Maid, and Niu Lang, the Oxherd. This story has not only been passed along by word of mouth, with consequent variations, but it has also been the basis for a popular stage play that used to be enacted at the appropriate time each year. Niu Lang, the Oxherd, was a rather stupid young chap who lived with his elder brother and his sister-in-law. Fortunately, Niu Lang had an ox that could talk: a fairy ox that was really the Golden Ox Star and had been sent down to earth for his protection. One day the ox said, "Niu Lang, your brother and his wife are wanting to get rid of you. If you are offered some meat dumplings, don't eat them. They'll have arsenic in them. You'd better suggest leaving and you'd better tell them that you want none of the family property except me."

Subsequent events showed that the ox knew what he was talking about, so Niu Lang insisted upon leaving and managed to have matters arranged so that the ox, his fairy caretaker, accompanied him. In time Niu Lang confided in the ox his wish for a beautiful wife, a proposition which did not prove too difficult for that ingenious animal.

"Just kill me," said the ox, "and from my hide make some leather shoes. They'll have the power to carry you to heaven where you'll see some beautiful girls bathing. Their garments will lie unguarded on the bank. Steal one, and when one of the girls chases you to recapture her clothes, you'll know which will be your future wife, but never, *never* give that garment back if you want to keep her."

Niu Lang followed his instructions. From the hide of the ox, he made a pair of shoes, and surely enough they carried him to heaven. There, in the heavenly river, seven beautiful girls were bathing and on the river bank were their clothes. Niu Lang snatched a garment and ran. At once one of the girls—the prettiest of them all—gave chase, but he would not return the garment. Instead, he persuaded her to marry him.

Niu Lang's bride was none other than Chih Nu, the youngest daughter of the Sun-god. She was the Spinning-Maid and it was her business in the Western Paradise to weave all the heavenly robes. But now she was married to a mortal and, as his wife, she forgot her celestial duties. Within the next three years they had first a son and later a daughter. They were such a happy family that Niu Lang thought Chih Nu had settled down and had become a staid married woman. He thought that the stolen garment could make no further difference, so he no longer guarded it carefully. His carelessness proved his undoing, for one day she found her garment, seized it, and ran away. She crossed the Silver Stream of Heaven—the Milky Way—but Niu Lang and the two star-children—two lesser stars in the constellation of Aquila—could not follow.

The grief of Niu Lang and the children was brought to the attention of the Jade Emperor who decreed that once a year on the evening of the seventh day of the seventh lunar month all the magpies in the world should make a bridge across the Heavenly River allowing the lovers to meet. At this time of the year the people hope for good weather so that Niu Lang and Chih Nu may have a happy reunion, because, in case of rain,

the flooded condition of the river makes it impossible for the magpies to make their wingy bridge.

The Northern Measure, or Bushel, is the Chinese name for the Big Dipper, and in it resides the Old Man of the Northern Measure, who is the God of Longevity. His partner in controlling human affairs is the God of Emoluments, the Old Man of the Southern Bushel, who dwells in the southern heavens. Together they were supposed to mete out the life span of each person, as well as to look after his welfare and progress during life. A story is told of a certain boy who learned from a fortune-teller that he would live no more than to the age of nineteen. The lad and his family carried on to such an extent that the fortune-teller told him to take some venison and wine up into the mountains the next day. There he would find two old men playing chess. At the opportune moment he should offer them the meat and drink, and then he should tell them his trouble. He followed the soothsayer's directions, found the old chess players, and with much weeping told them his fate. The old men, who were in reality the Old Man of the Northern Measure and the Old Man of the Southern Measure, were greatly touched by the youth's conduct, so they brought out their record book and looked up the boy's name.

"That's right," they said, "nineteen years."

We can imagine the boy's joy when he saw one of the old men take his brush-pen and change the "nineteen" into "ninety."

The God of Longevity and the God of Emoluments are often shown in the company of the God of Happiness. The Long-Life God can be recognized by his prominent forehead. He usually carries in his hands a large peach, one of the many symbols of long life, and he is often mounted on a stag. However, craftsmen have sometimes become confused and have depicted the wrong god riding deerback.

The importance of Ursa Major is suggested by the fact that it is the stellar home not only of the God of Longevity but also of K'uei Hsing, the distributor of literary degrees, who was supposed to reside in the square part of the Dipper. When he was a mortal, his face was exceedingly ugly, and he was afflicted with lameness. In spite of his physical handicaps, he had aspirations. He tried out in the old-style examinations, and took first place. It was the custom for the winner to appear before the Emperor, who presented him a golden rose. But the Emperor refused to grant the rose to K'uei Hsing because of his ugliness. In the depths of his disappointment, K'uei Hsing went to a high cliff overlooking the sea and cast himself into the waves. At this juncture, a great sea dragon surfaced and, bearing K'uei Hsing upwards on its head, it carried him away to the group of stars which became his home. Naturally, he was the favorite deity of all scholars under the old system of examinations. His flag had a black field upon which were the seven white stars of the Big Dipper. Chinese craftsmen have used K'uei Hsing as a decorative motif in various media. No design could be more appropriate on a porcelain brush-pen jar; and a folding bean-oil lamp of pewter with K'uei Hsing in brass inlay may have accompanied a scholar to his tiny examination cubicle to give a ray of light through the night hours.

The pole star did not escape the notice of the Chinese. There is a folk tale about an avaricious woman who wanted to become rich quickly. While she kowtowed and burned incense to the North Star, suddenly he appeared right before her.

"What do you want?" asked the North Star.

The woman was so embarrassed that she covered her face with her hands and could not utter a word.

"Oh, you want something to cover your face!" exclaimed the North Star. Next day the woman's face was covered with whiskers, and she found what could happen to a person for being too greedy.

In this day in which we have a fresh appreciation for a chief executive of high moral character, it is of interest to note that Confucius (551-479 B.C.) recognized that stability and freedom from vacillation are qualities of a virtuous ruler. "A virtuous ruler," he taught, "is like the Pole star, which keeps its place, while all the other stars do homage to it."

Unfortunately, the teachings of Confucius, and also the folklore of China, have been cast aside as outmoded and superstitious, but surely they deserve to be preserved, along with the myths of Greece and Rome, as facets of the culture of a great people.

Spring

By NORMAN ROCHEVILLE

Gaily eying,
Smoothly flying
O'er the forest floor:
Poetry of motion—seldom seen before!

Onward winging,
Ever singing,
Round and round in flight;
Song of songs! Songs that thrill—every hen in sight!

Flight of mating,
Undulating,
Free from every care!
Like a poem of love—gliding through the air!

Deftly swerving,
Winging, curving,
Mixed with dreamy tone—
One that tells each female—she is his alone!

Babes of the Woods—Woody Plant Seedlings

By E. LAURENCE PALMER

This is the seventy-fifth of NATURE MAGAZINE'S *special educational inserts.*

AT FIRST it was planned to make this spring insert a general seedling number. Then it developed that there were so many interesting seedlings that some division was to be desired. Accordingly, we favored writing this number on the seedlings of woody plants, or the babes of the woods, leaving to a later number similar treatment of the seedlings of herbaceous plants. It is possible that this number may stimulate some readers to learn for themselves how the seedlings of their native herbaceous plants look. With the coming of this spring both the reader and the writer of this article can start systematically more seriously to study this aspect of Nature.

There are a few good publications dealing with the seedlings of plants, but the best one concerned with woody plants is undoubtedly Miscellaneous Publication Number 654, prepared by the Forest Service of the U.S. Department of Agriculture. Its title is *Woody Plant Seed Manual*, and we have leaned heavily on this publication in the preparation of this insert. Because of the expense, and because of its technical nature, it is unlikely that many readers of *Nature Magazine* would have access to this book. This insert may serve as a substitute, in part at least.

We do not intend here to say much about the technical characters of seeds and of seedlings, but we must point out that many of the current high school texts indicate that the authors do not understand the differences between seeds and fruits. When we eat string beans we eat fruits. When we eat lima beans we usually eat only seeds. The basis of a fruit is usually the pistil of the flower, while the basis of the seed is the ovule. According to this, despite what you may read in some texts, a kernel of corn is a fruit and the often-studied bean that we bake is a seed. One can hardly draw homologies between two structures so different as a fruit and a seed.

To help keep the record straight, in this insert we have started off with each unit by stating whether the reproductive unit that breaks from the mother plant to start a new individual plant is a seed or a fruit. According to this, the reproductive unit of maple, elm, hackberry, cherry and ash are all fruits, while the reproductive unit of horse chestnut, witch hazel and catalpa are true seeds, or either in the case of the horse chestnut. It seems to be more usual for woody plants to have a fruit rather than a seed as the reproductive unit despite the fact the term seed is commonly applied to the fruit by many foresters, naturalists and Nature writers.

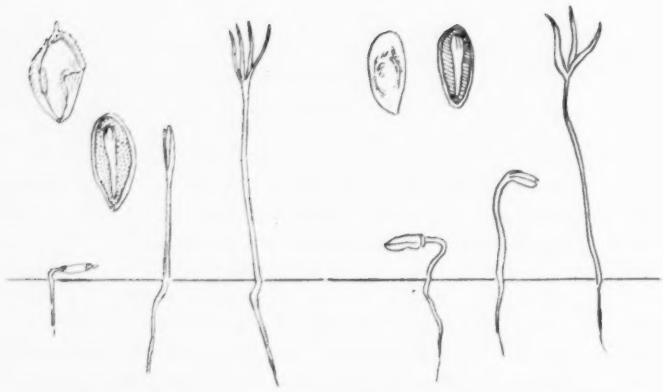
A major difference in seeds may lie in the presence of food inside the seed but outside the embryo. The next few pages will show how greatly plants vary in this respect. The food outside the embryo is normally considered as endosperm, but we avoided use of this word in treating the individual plants. The embryo plant in the seed may be straight, coiled, folded or even twisted, and these variations help in describing seeds accurately.

The embryo plant may be conspicuous because of what some call the seed-leaves, or cotyledons. Usually these structures look somewhat like leaves, but more commonly carry stored food that gives the young plant a lift in its early days. As the plant gains independence these cotyledons tend to disappear, either by dropping off or by being considerably reduced in size and importance. The number of cotyledons may have some significance. In most of our broad-leaved trees there are two cotyledons, while in the pines and their relatives there are more. There are relatively few woody plants in which the seed has but one cotyledon. Palms and sweet brier, which are monocotyledonous, are not here treated. The shape and thickness of the cotyledons may sometimes help to identify a seedling. The deeply lobed cotyledons of basswood are most easily recognized. Many seedlings look much like other seedlings, but in the early stages the old seed coat frequently may be found. Under these circumstances one should examine a seedling with great care before attempting to decide what it may be. We admit that our illustrations sometimes show little differences between closely related species. The likenesses may be as significant as the differences in the study of plants in their early stages.

Some readers may wish to make controlled studies of the germination of the seeds of various common woody plants. If the seeds are wrapped in damp cloths and kept where it is normally reasonably warm one may expect a seed to germinate. Then you can see for yourself what the nature of the differences may be.

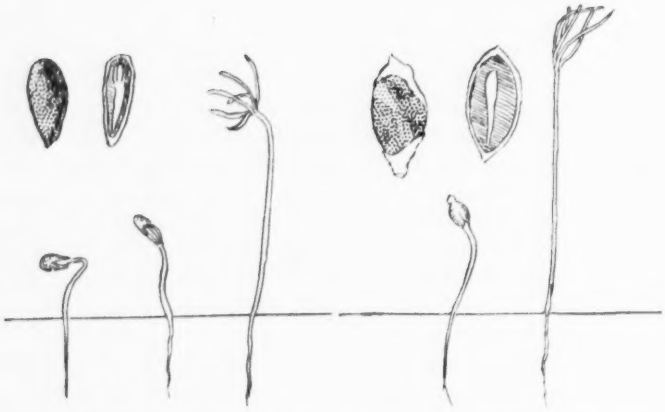
Because of heavy seed coats some seeds germinate poorly. If the seeds are soaked a short time in sulphuric acid, or in hot water, germination may be hastened. Again, if a hard seed coat is scratched with a file, or even by a sand blast, germination may be hastened by helping air and water to get to the young plant inside the seed.

Even after germination, which may be low, there is usually a high mortality rate in the earlier stages of our trees. Shade, thinning, watering, and control of fungi and of insect pests, may hold an interest for many students of seedlings. Even man recognizes a unique food value in the seedlings of some plants. Bean sprouts are favorites in Chinese dishes, for example. In a sense a seedling is the last gasp of the preceding generation to start a new generation. The food stored in the cotyledons of the embryo plant, or in the endosperm outside the embryo but inside the seed, was developed by the preceding generation and most of this strength is exhausted in giving the new seedling the ability to survive.



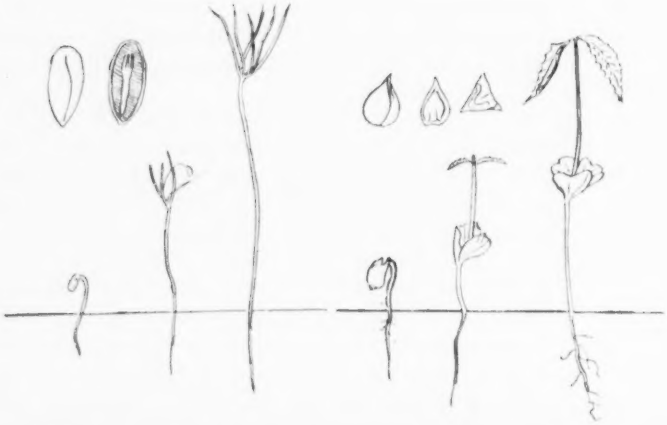
BALSAM FIR, Seedlings after two, five and seven days.

HEMLOCK, Seedlings after two, four and seven days.



SPRUCE, Seedlings after two, five and seven days.

LARCH, Seedlings at one and eight days.



RED PINE, Seedlings after one, seven and thirty days.

BEECH, Seedlings after two, five and seven days.

BALSAM FIR

Abies balsamea

Reproductive unit: Seeds, about 1/5-inch long, with wings from fruit tissue, shed by wind in September to November; about 60,000 per pound of cleaned seed. Good crop every 2 to 4 years. Some food stored outside embryo.

Germination: Practice to stratify in sand at 41°F. for 3 months. May be fall-sown, or, if stratified, in spring. Germination begins in 10 to 35 days at to 33% if spring-sown. Needs protection, and thinning to 60-80 per sq. ft.

Seedling: Seed above ground. Seedling to 1 inch at 2 days; to 1½ inch, in 1 week. About 4 cotyledons show.

HEMLOCK

Tsuga canadensis

Reproductive unit: Seeds, about 1/5-inch long, with wings from fruit tissue, shed by wind, September through winter, with good crop every 2 to 3 years; about 180,000 per pound. Some food stored outside the embryo.

Germination: Practice to stratify and spring sow or to broadcast in fall. Germination about 30% in 2 to 3 months, if stratified in moist sand at 41°F. Should be shaded, at least at first. Few diseases, but may damp-off.

Seedling: Seed above ground. Seedling to 1 inch at 2 days; to 2 inches, at 1 week. Three or more cotyledons show.

COLORADO SPRUCE

Picea pungens

Reproductive unit: Seeds, about ⅛-inch long, with small wing from fruit tissue, shed by wind in fall and winter, with good crop usually each year; about 100,000 per pound. Some food stored outside the embryo.

Germination: Usually broadcast in fall or drilled to yield 75 usable seedlings per square foot, buried about ¼ inch; about 73% germination 2 weeks after spring planting.

Seedlings: Need protection from rodents and birds, and soil should be treated with sulfuric acid or aluminum sulfate to limit damping off. Seed above ground. Seedlings to 1 inch in 2 days; to 1½ inch, in 1 week; with 6 or more cotyledons.

AMERICAN LARCH

Larix laricina

Reproductive unit: Seeds, about 1/5-inch long with wing from fruit tissue, wind distributed after September, with good crop every 5 to 6 years; about 300,000 per pound. Food stored abundantly outside the embryo.

Germination: Stored in dark in sealed containers at 32-50°F. seeds live 3 to 4 years, or even to 6, with average germination about 50%; sown in fall, should be covered with burlap and to ¼ inch of soil, thin to 50-75 per sq. ft.

Seedlings: Bring seed above ground and show 5-6 cotyledons, reaching to 2 inches in about 1 week.

RED PINE

Pinus resinosa

Reproductive unit: Seed, to under 1/5-inch long, oval but pointed at one end. Seeds shed from fall through following summer, with good crops every 3 to 7 years; about 50,000 per pound. Food stored outside embryo.

Germination: Usually germinate easily without special treatment at about 75%, usually sowing about 6 ounces per 100 square feet of seed bed, with germination in 10 to 40 days in spring sowing, or may delay 2 years.

Seedlings: May be attacked by a European needle disease. Seed well above ground as shown. Many cotyledons.

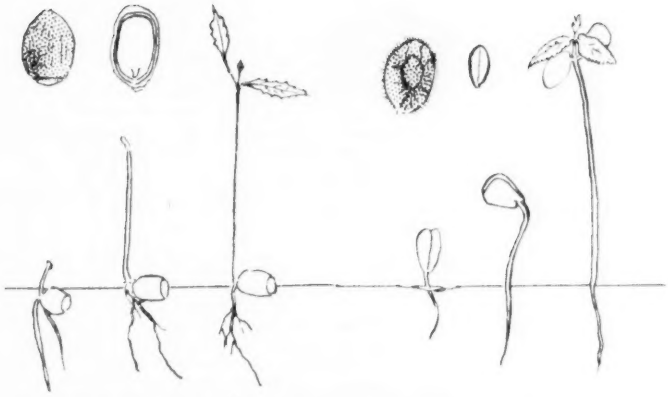
BEECH

Fagus grandifolia

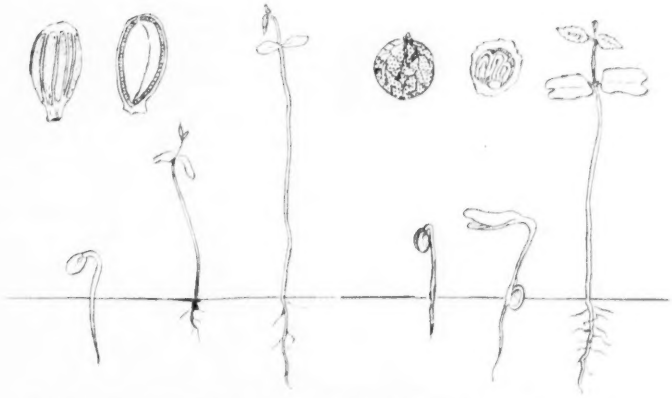
Reproductive unit: Small nut, a fruit, to ¾-inch long, 3-sided, light brown, shining, averaging 1600 per pound. Shed after first heavy frost, with major crops every 2 to 3 years. No food outside the embryo, which is folded.

Germination: Stored in sealed containers at 34°F. to 41°F., remain alive through winter, with average germination of about 40% after about 5 months, but capable with treatment of to over 90%. Need protection against rodents.

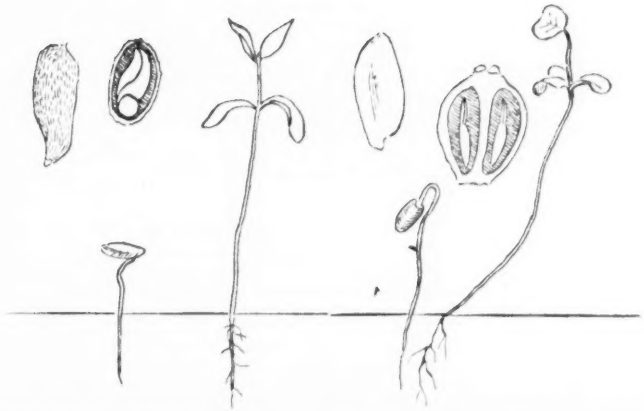
Seedlings: With seed above ground, with fluted cotyledons broad and notched and to 6 inches high in 1 week.



MOSSY-CUP OAK, Seedlings after one, five and twelve days. **ELM, Seedlings after one, three and twenty-one days.**



HOP HORNBEAM, Seedlings after two, twenty-two and twenty-seven days. **HACKBERRY, Seedlings after one, two and five days.**



OSAGE ORANGE, Seedlings after one and eight days. **JAPANESE BARBERRY, Seedlings after one and ten days.**

MOSSY-CUP OAK

Quercus macrocarpa

Reproductive unit: Acorn, a fruit containing 1 seed, to 2 inches long and 1½ inches wide, shed in August and September, with good crops every 2 to 3 years; about 75 per pound, 2 years to mature. No food outside embryo.

Germination: Need protection from animals. Germination may begin a month after reaching ground, and averages 45%, but with treatment may be increased.

Seedlings: Seed remains at or just under ground surface. Vigorous tap-root. Shoot may reach height of 4 inches 2 weeks after germination begins, with a pair of true leaves reasonably developed. Cotyledons remain hidden.

AMERICAN ELM

Ulmus americana

Reproductive unit: Winged fruit, a samara, with wing surrounding seed-bearing portion, shed by wind, maturing from March to June, 1 month after flowering, with good crops each year; 68,000 per pound. No food outside the embryo. Eaten by birds and rodents.

Germination: Average 60%, but may be raised to over 90%. May germinate 1st or 2nd springs. May damp-off.

Seedlings: May reach to 2½ inches in 3 weeks. Two blunt, broad cotyledons with slightly shallowly notched tip. First leaves much like those of mature trees.

HOP HORNBEAM

Ostrya virginiana

Reproductive unit: One-seeded fruit, a nutlet, to 1/3-inch long and to ⅛-inch wide, contained in a bladder, usually one of a group forming hop-like cluster, shed usually August through early winter. About 30,000 per pound, with about 2 pounds per bushel of bladders. No food outside embryo.

Germination: Stored over winter at 41°F. Germination may be to 90% if stored in moist sand 2 months at about 70°F., 6 months at 50-77°F. and 3 months at 41°F.

Seedlings: Seed borne above ground. Two broad cotyledons becoming narrow but broadest near tips, to 1/3-inch long. Seedlings, to 2½ inches high in 4 weeks, when leaves show.

HACKBERRY

Celtis occidentalis

Reproductive unit: Egg-shaped, thin-fleshed, cherry-like fruit, containing bony nutlet containing 1 seed, with folded cotyledons and little food outside embryo. About 2000 per pound of fruits; 4000 per pound of cleaned seed.

Germination: Fall-sown seeds may germinate at 40% following spring, more quickly if surrounding pulp is crushed and if stored in moist sand at 41°F. for 2-3 months.

Seedlings: Seed remains at ground level but 2 folded cotyledons are raised high, showing notched tips. Cotyledons, to 1 inch long; seedlings, to 5 inches in 1 week.

OSAGE ORANGE

Maclura pomifera

Reproductive unit: About 80 orange-sized green fruits to a bushel, yield about 24,500 seeds weighing about 14,000 to the pound. A small amount of food material surrounds the folded embryo. Fruits are shed in fall and winter.

Germination: Stored in sealed, air-tight containers at 41°F. cleaned seeds may live 3 or more years, but usually germination takes place first spring at about 58%.

Seedling: Cotyledons borne above ground, with seedling reaching height of to 4 inches in a week. In nurseries, are grown in rows 1 foot apart. Strong taproot.

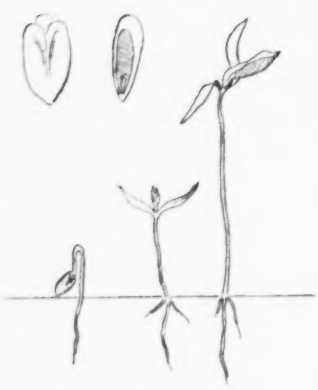
JAPANESE BARBERRY

Berberis thunbergii

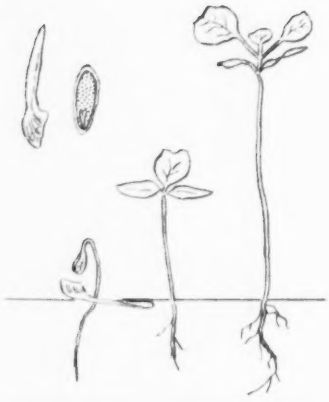
Reproductive unit: Fruit bearing 1 to 2 seeds, a bright red berry ripening in late summer and dropping through fall and winter. Cleaned seeds weigh about 27,000 to the pound. Abundant food stored outside straight embryo.

Germination: Begins first spring on dry soil, with about 90% germination to be expected in germinators kept at about 55°F. for nights and 75°F. for days for 40 days.

Seedling: May suffer from damping-off disease. Cotyledons borne high above ground, rather broad and blunt. Seedling reaching to 4 inches in 2 weeks normally.

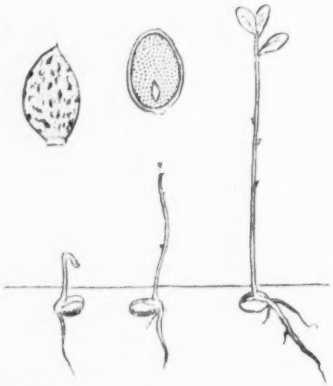


MAGNOLIA, Seedlings after one, thirteen and thirty-one days.



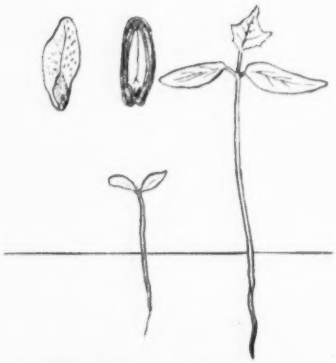
TULIP TREE, Seedlings after one, eighteen and forty-six days.

PAWPAW, Seedlings after nine and eighteen days.



SPICEBUSH, Seedlings after two, three and ten days.

WITCH HAZEL, Seedlings after one and twenty-one days.



SWEETGUM, Seedlings after two and thirty days.

MAGNOLIA

Magnolia acuminata

Reproductive unit: Dark red, smooth, 1/3-inch fruit bearing seeds about ½ inch long that are somewhat cherry-like with soft oily outer portion. About 4600 cleaned seeds to the pound. Much food outside embryo.

Germination: With special care to prevent freezing and stored 5-6 months germination may be to 40% or slightly higher on average. Live scratched seeds show green scratches in 2-3 days if kept on moist blotting paper.

Seedling: Seed borne above ground, releasing rather long cotyledons (to 1 inch). Height, to 3 inch in 1 month.

TULIP TREE

Liriodendron tulipifera

Reproductive unit: A winged fruit (samara) with wing at angle to seed-bearing portion, a part of a conelike fruit. About 100 units per cone weighing 14,000 to the pound. Abundant food stored outside small straight embryo.

Germination: Dry stored seeds average about 5% in germinative ability due probably to low fertility and viability. In nursery, seeds sown at 50-75 per linear foot.

Seedling: Cotyledons borne above ground, to about ⅔-inch long, rather bluntly pointed, to 3 inches high in 4 weeks. First leaves broad and notched at tip.

PAWPAW

Asimina triloba

Reproductive unit: Brown to black fleshy berry to 6 inches long and to 1½ inches wide, bearing several flattened, 1-inch long, shining, brown seeds weighing, when cleaned, about 700 per pound. Much food outside small embryo, which is inverted.

Germination: Begins late summer of year following ripening of fruit, or year later with average of treated seeds about 60%. Stratification in moist sand at 50°F. for 100 days may stimulate.

Seedling: Seed borne above ground and dropped at 2 weeks. Height, to 5 inches in 3 weeks.

SPICEBUSH

Lindera benzoin

Reproductive unit: Fruit, cherry-like, 1-seeded, red, maturing September-October. Cleaned seed about 4500 to the pound, with 100 pounds of fresh fruit yielding 15-20 pounds of seed. Abundant food outside small embryo.

Germination: Stored in moist sand at 77°F. for 2-4 weeks, followed by 3-4 months at 41°F. produced seeds that should germinate 75% in 2-3 weeks.

Seedling: Seed remains under ground yields seedling 1-inch high in 2 days; 2 inches, in 3, and to 5 inches, in 10 days.

WITCH HAZEL

Hamamelis virginiana

Reproductive unit: Shining black seeds with light areas at larger end expelled in late fall following previous year's flowering. Seeds weigh about 10,000 to the pound. Abundant food stored outside slender, straight embryo.

Germination: Germination may be 1st or 2nd spring following shedding of seeds. Good results from stratifying 2 months nights at 68°F. and days at 86°F. may yield to 80% germination.

Seedling: At 3 weeks, cotyledons may be to 1 inch long and seedlings to 3 inches high.

SWEETGUM

Liquidambar styraciflua

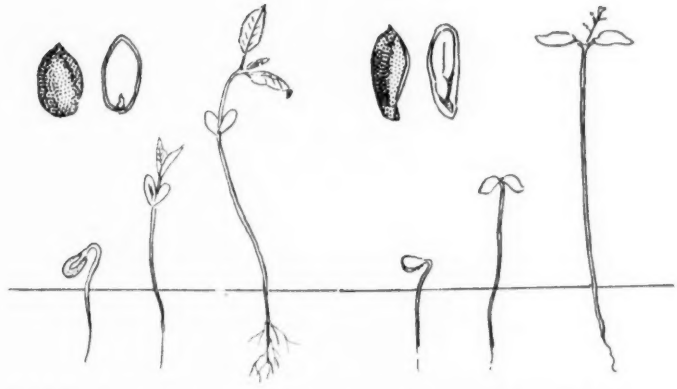
Reproductive unit: Brown, spherical clusters to 1½ inches through, expel long-winged wafers to¼-inch long the wing adding another ¼ inch. Seeds are shed September-November with good crop about every 3 years. 82,000 cleaned seed per pound. Some food outside embryo.

Germination: 7-8 seeds per fruit, may be stored year at low temperatures. Germination about 70%, but in practice may be 50% in 20 days in South in winter.

Seedling: Two cotyledons, each about 1 inch long. Seedling, to 3 inches high in 1 month with first leaves.

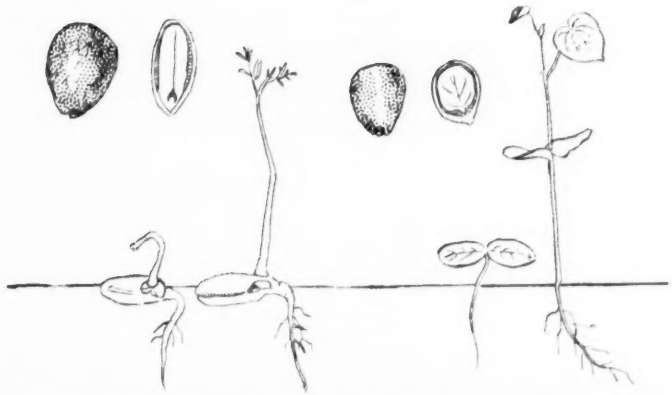
PEAR, Seedlings after one, three and twelve days.

APPLE, Seedlings after one, nine and sixteen days.



CHOKECHERRY, Seedlings after one, three and eleven days.

MOUNTAIN ASH, Seedlings after one, three and twenty-nine days.



KENTUCKY COFFEE TREE, Seedlings after two and five days.

REDBUD, Seedlings after four and thirty days.

PEAR

Pyrus communis

Reproductive unit: Well-known fleshy fruit yielding pointed seeds, to about ½-inch long, weighing cleaned seeds at 15,000 per pound, with 100 pounds of fruit yielding about 1 pound of seed. Some food outside large embryo.

Germination: Seed stratified in moist sand 45 days at 50°F. may average 65% germination while untreated may be about 1%. Ordinarily difficult to germinate.

Seedling: Seed and cotyledons forced above ground and in 1 week seedling may be to 2 inches high with 1st true leaves showing. Cotyledons persist 2 weeks.

APPLE

Pyrus malus

Reproductive unit: Well-known fleshy fruit bearing in core pointed brown seeds, 4-10 per fruit. About 20,000 cleaned seeds per pound, with 100 pounds of fruit yielding under 1 pound of seeds. Some food outside the embryo. Embryo large and straight.

Germination: Dormant seeds may be revived in moist sand at 32-50°F. for 1-3 months with this varying in related species.

Seedling: Seed raised above ground becoming free of cotyledons in about 2 days. Height of seedling to 3 inches in 2 weeks when true leaves have appeared.

CHOKE-CHERRY

Prunus virginiana

Reproductive unit: Well-known cherry with hard pit and soft surrounding flesh, which disintegrates or may stimulate food value affecting preservation. Fruits cleaned down to pit weigh nearly 6000 to the pound. Little food outside large embryo.

Germination: Common practice to stratify seeds from 3-5 months at 41°F. giving an average germination of 43%, but plant not commonly cultivated.

Seedling: Seed lifted above ground to a height of 3 inches in 3 days, when true leaves appear. May reach 6-inch height in 10 days.

MOUNTAIN ASH

Sorbus americana

Reproductive unit: Juicy red fruit maturing early fall and shed fall and winter. Seeds stout, horn-shaped, about 130,000 to the pound. Some food outside the embryo, which is large, straight, with root towards pointed end of seed.

Germination: Forced germination by stratification in moist sand at 41°F. for 3 months may yield to 33% germination after 11 months.

Seedling: Seed and cotyledons above ground, with 1st leaves showing in 3 weeks at height of 2 inches.

KENTUCKY COFFEE TREE

Gymnocladus dioica

Reproductive unit: Stout pods, to 10 inches long, bearing 3-6 seeds to ¾ inches long, dull, dark brown and hard. Matures in fall, but on tree until spring. 100 pounds of pods yields 30-50 pounds of cleaned seeds weighing 275 per pound. Small amount of food outside embryo.

Germination: Storage cold and dry for over year is recommended. 5 minutes in hot water at 195°F. and scratch with file may yield 75% germination in 1 month.

Seedling: Seed remains at surface of earth and seedling may reach 4-inch height in 5 days.

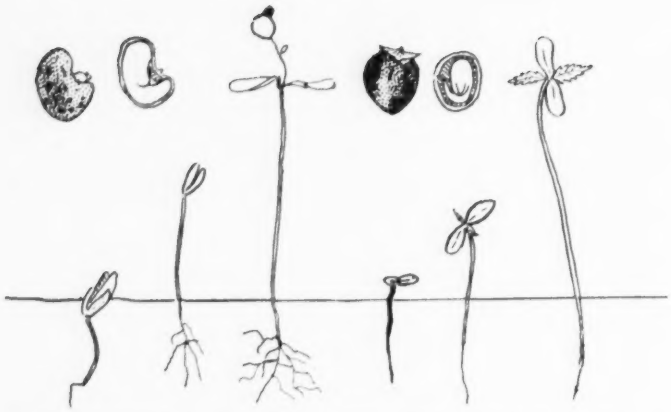
REDBUD

Cercis canadensis

Reproductive unit: Thin, 3-inch pods, shed in tall of blooming year, with heavier crops in alternate years yield small, hard, dark seeds at 25 pounds of seed to 100 pounds of pods, or 18,000 seeds per pound. Rather abundant food outside embryo.

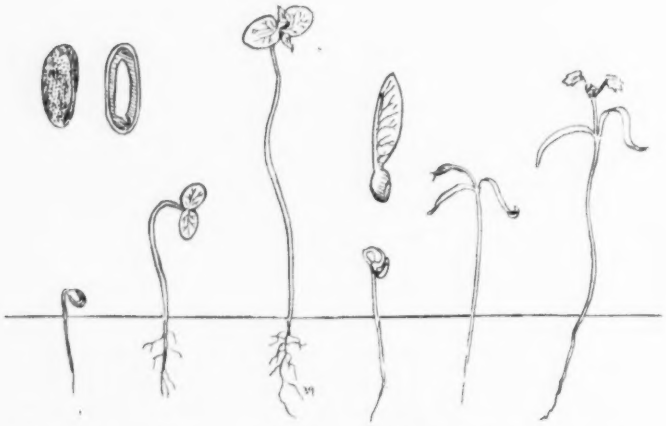
Germination: Seed soaked in hot water, or scratched, or 30 minutes in sulfuric acid followed by 2 months' stratification at 41°F. may yield 75% germination.

Seedling: Broad cotyledons, to 1-inch long borne above ground. 1-month seedling about 3 inches high.



BLACK LOCUST, Seedlings after one, three and eight days.

STAGHORN SUMAC, Seedlings after two, four and seventeen days.



BITTERSWEET, Seedlings after one, five and thirty-nine days.

SUGAR MAPLE, Seedlings after one, seven and forty-three days.

HORSE CHESTNUT, Seedlings after two and four days

VARNISH TREE, Seedlings after one, three and five days.

BLACK LOCUST
Robinia pseudoacacia

Reproductive unit: Flat pods bearing many hard seeds shed seeds in fall and winter. 100 pounds of fruits yield about 20 pounds of seeds averaging 25,000 to the pound and bearing no food outside the embryo.
Germination: Germination of about 70% can be effected by soaking in hot water, or sulfuric acid, the water at 212°F for to 5 minutes and acid to 2 days at 70°F.
Seedlings: Cotyledons above ground to 1 inch high in 1 day and to 2 inch high with 1st leaves at 1 week. Cotyledons broad, blunt and becoming thin.

STAGHORN SUMAC
Rhus typhina

Reproductive unit: Red, sour, hairy, cherry-like unit containing 1 hard seed. Usually distributed by animals in fall and winter. 30,000 fruits per pound yielding seeds at 53,000 per pound. No food outside embryo to any great extent.
Germination: Soaked in sulfuric acid for an hour or scratched may increase germination to 40%, but it may be as low as 4% normally or abnormally up to 90%.
Seedling: Seed and cotyledons borne above ground, with seed coat on one cotyledon. Cotyledons, to 1 inch.

BITTERSWEET
Celastrus scandens

Reproductive unit: Fruits ripen in fall, freeing red seeds 4-8 per fruit, weighing nearly 30,000 per pound and borne in reasonable abundance each year. Some food stored outside straight, large-cotyledoned embryo.
Germination: Stored 20 months in sealed jar at 41°F. gave 9% germination spring of first year and .2% in fall. Potential germination to 90%. Sow seed in winter.
Seedling: Seed and cotyledons borne above ground, to 3 inches high at 10 days and first leaves at 1 month at 4-inch height.

SUGAR MAPLE
Acer saccharum

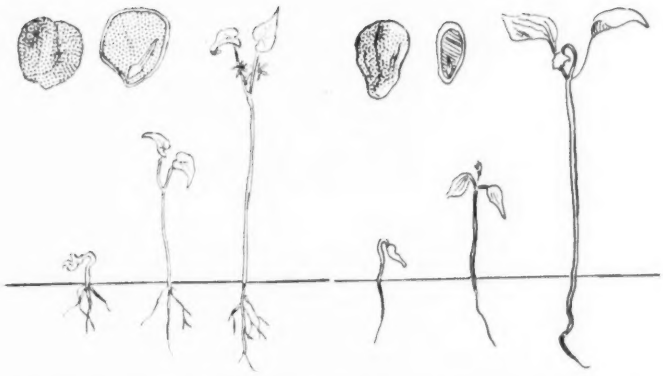
Reproductive unit: Winged fruit, a samara, bearing a single seed shed in late fall abundantly every 3-7 years. Cleaned seeds not fruits average about 22,000 per pound. Little food outside wrinkled embryo.
Germination: Stratified in moist sand at 40°F. for 2 months germination may be about 40%, but a month at 68°F. by night and 86° by day is recommended for tests.
Seedling: Wrinkled and folded cotyledons bear seed above ground and become free in about 1 week, when 1st leaves appear. May reach 5-inch height in 6 weeks.

HORSE CHESTNUT
Aesculus hippocastanum

Reproductive unit: A soft, coarsely spined fruit that breaks in fall to free 2-3 seeds, which are to over 1 inch in diameter, dark brown, with large light scar. About 100 seeds to the pound. Little food outside the coiled embryo.
Germination: Seeds do not survive drying but stored at 40°F. at low humidity viability may drop from 90 to 29% in 5 months. Better to seal and keep at about 32°F.
Seedling: Seed and cotyledons remain at ground surface, appearing in early spring and by 4 days may reach height of 4 inches and show 2 sets of true leaves.

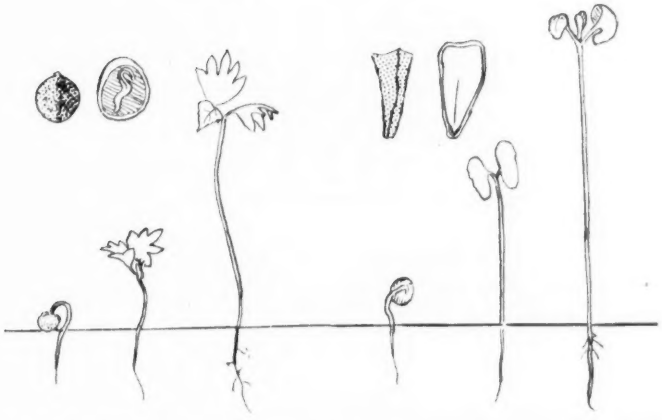
VARNISH TREE
Koelreuteria paniculata

Reproductive unit: Bladdery capsules borne in abundance each year bear 3 round black seeds that number about 3000 to the pound. Should be collected in September and October. Little food outside coiled embryo.
Germination: Seeds stored in sealed jars at 40° to 90°F. showed 15% germination at end of 10 years. Normally treated with sulfuric acid 1 hour or with hot water and scratched may in moist sand show 41% in 90 days.
Seedling: Seed borne aloft on uncoiled cotyledons to 1 inch at 1 day; to 4 inches, at 3 days when true leaves appear.



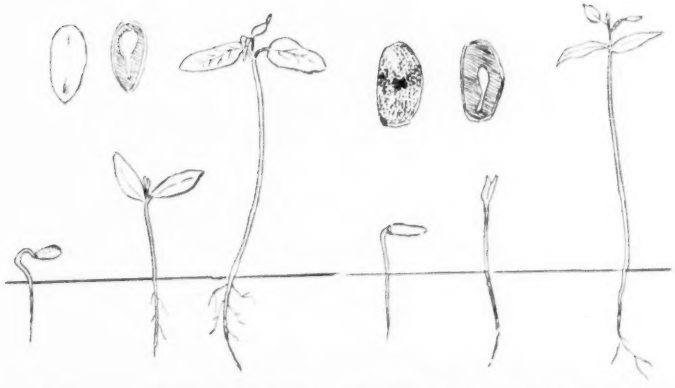
WOODBINE, Seedlings after one, three and twenty-two days.

WILD GRAPE, Seedlings after two, four and seventeen days.



BASSWOOD, Seedlings after one, three and nineteen days.

EUCALYPTUS, Seedlings after one, eight and forty-two days.



FLOWERING DOGWOOD, Seedlings after three, eight and thirty-one days.

PERSIMMON, Seedlings after four, six and eight days.

WOODBINE

Parthenocissus quinquefolia

Reproductive unit: Blue, berry-like fruits, ¼ inch in diameter bearing 1-3 seeds ripening in fall. 100 pounds of fruit yield 25 pounds of seeds averaging 19,000 to the pound. Small straight embryo and abundant food outside.

Germination: Takes place spring following falling of fruit or may be delayed. Stratification in moist sand for 2 months at 41°F. may hasten the average 70% germination.

Seedling: Seed and cotyledons borne above ground. Cotyledons somewhat heart-shaped. Seedling height to 3 inches in 3 days and true leaves appear in about 3 weeks.

WILD GRAPE

Vitis riparia

Reproductive unit: A blue berry, juicy and sour, ripened from September to November and shed through fall and winter, to 3/8 inches in diameter and bearing to 4 seeds. 100 pounds of fruit yield to 12 pounds of seed averaging 15,000 per pound. Food outside large embryo.

Germination: Little loss of life in seeds stored 26 months at 41°F. with average germination 82% if seeds are stratified 4 months in sand at 41°F. Sow in fall.

Seedling: Seed and seedlings borne above ground by seedling that at 4 days may bear leaves at 2-inch height.

BASSWOOD

Tilia americana

Reproductive unit: Fruit, a wing-borne bunch of spherical nut-like capsules that contain 1-4 seeds. 100 pounds of fruit yield 75 pounds of clean seed averaging 5000 to the pound. Contorted embryo embedded in much yellow food.

Germination: Stored at room temperatures and kept dry will remain alive 2 years or at lower temperatu es longer. Average germination 30% tested 2 months in sand at 65°F.

Seedlings: Seed and cotyledons borne above ground. Cotyledons deeply 5-lobed. At 3 days, seedling-is to 2 inches high; at 2 weeks, 2½ inches with first leaves.

EUCALYPTUS. BLUE-GUM

Eucalyptus globulus

Reproductive unit: Woody capsule, to 1 inch through yields from 3-6 valves small, angular brown seeds weighing 138,000 to the pound in spring. Embryo with twisted cotyledons. Without food outside embryo.

Germination: Stratified seed in moist sand to 2 weeks at 65°F. should yield 75-80% germination.

Seedling: Seed and broad-blunt cotyledons borne above ground, reaching in 1 week height of to 4 inches and 1st true leaves in about 6 weeks from start of germination.

FLOWERING DOGWOOD

Cornus florida

Reproductive unit: Cherry-like fruit, to ¼-inch in diameter, usually containing 2 seeds, borne to ripen in fall, with good crop every other year. 100 pounds of fruit yield 37 pounds of clean seed to 4500 per pound. Embryo, t aight, well surrounded with food.

Germination: 10-12 weeks in damp sand at 41°F. recommended treatment. In tests, germination may be about 35%. Seeds sown in fall or stratified and sowed in spring usually.

Seedling: Seed and cotyledons borne above ground, reaching height of 3 inches in a week and to 4 inches in a month when true leaves have appeared.

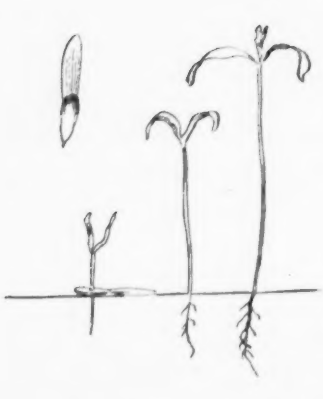
PERSIMMON

Diospyros virginiana

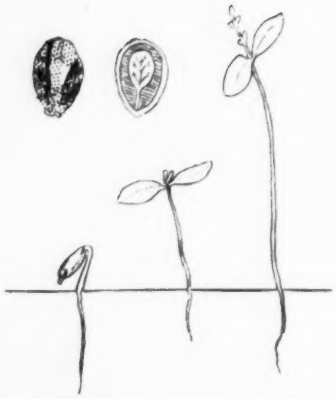
Reproductive unit: An orange to yellow to black berry containing 3-8 flattened ½ inch, roughened, light brown seeds maturing in fall and being shed in winter. 100 pounds of fruit yield 20 pounds of seed averaging 1200 to the pound. Straight embryo and abundant surrounding food.

Germination: Normally germinate first spring but stratified in moist sand at 50°F. for 2-3 months may average to 6.5% but usually lower in plantings.

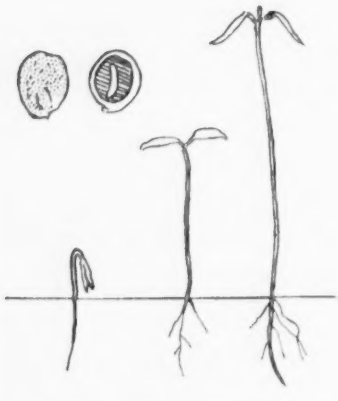
Seedling: Seed and cotyledons borne above ground reaching 6 inch height and showing first leaves at about 1 week.



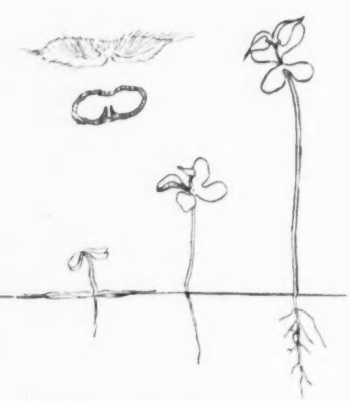
BLACK ASH, Seedlings after one, eight and fourteen days.



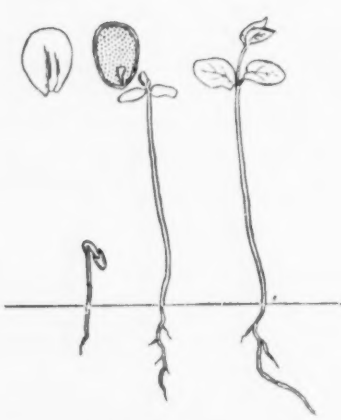
PRIVET, Seedlings after one, fifty and one hundred and thirty-two days.



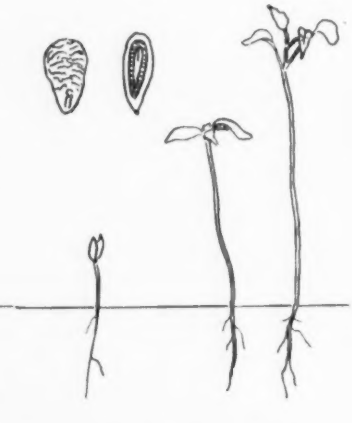
BITTER NIGHTSHADE, Seedlings after one, six and twelve days.



CATALPA, Seedlings after one, eight and twenty days.



HONEYSUCKLE, Seedlings after one, thirteen and thirty-one days.



ELDERBERRY, Seedlings after two, thirty-three and forty-five days.

BLACK ASH

Fraxinus nigra

Reproductive unit: Fruit, a winged samara, to 1½-inch long, bearing single seed. Cleaned seed run about 8000 to the pound. A rather small embryo is well surrounded with abundant food in the seed.

Germination: Seed may be treated 1-3 months at 41°F. Germination low and may average only 20% in tests, but when sown in drills to 1 foot apart may germinate to 75%. Relatively free from fungous attack.

Seedling: Seed remains at ground surface but cotyledons are borne above, wrinkled at first. In 1 week, to 2 inches high with first leaves appearing 2nd week.

PRIVET

Ligustrum vulgare

Reproductive unit: Black berry-like or cherry-like fruit bearing 1-4 seeds, ripening in fall and persisting through winter. About 20,000 seeds to the pound. Embryo straight and well surrounded with food in seed.

Germination: Usually in practice stratified in moist sand to 3 months at 32-50°F. but germination is as low as 27%. Usually sowed broadcast in fall.

Seedling: Seed and cotyledons borne above ground reaching to 1 inch in 5 days. 1st leaves appear at 7 weeks after germination.

BITTER NIGHTSHADE

Solanum dulcamara

Reproductive unit: Brilliant red berry, about ½-inch long, ripening in late summer and fall, bearing seeds 1/16-inch long, like flattened disks and weighing about 350,000 to the pound. Small straight embryo with much surrounding food.

Germination: Normal germination of about 46% in 3 weeks without treatment but with stratification and temperature control may be brought up to 87%. Rather high germination.

Seedling: Seed and cotyledons raised above ground to 1½ inch in 1 week and to 2 inches in 2 weeks when leaves begin to show.

CATALPA

Catalpa bignonioides

Reproductive unit: Double-winged wafer freed from long, pod-like fruits through winter. 100 pounds of fruits yield about 35 pounds of seeds, which number 20,000 to the pound. Little if any food outside embryo.

Germination: Stored dry remains alive at least 2 years. Germination rather high averaging nearly 80% w th little management.

Seedling: Seed remains at ground surface but doubly lobed cotyledons raised above ground to 3 inches in 1 week. 1st leaves appear by 2nd week.

HONEYSUCKLE

Lonicera tatarica

Reproductive unit: Orange-red berries, each containing many seeds, maturing late summer. 100 pounds dried fruit yield 30 pounds cleaned seed which weigh 140,000 to the pound. Small embryo surrounded by great amount of food in seed.

Germination: Usual natural germination the first spring but may take place late fall of first year. Average germination is about 66% in cared for seeds. Constant temperature of 50°F. slows up germination.

Seedling: Seed and cotyledon above ground. Height, to 1 inch in 3 days. 1st leaves at about 1 month.

BLACK-BERRIED ELDER

Sambucus canadensis

Reproductive unit: Black, juicy berries each with 3-5 1-seeded nutlets that ripen in summer. 100 pounds fresh fruit yields about 12 pounds of cleaned seed weighing 286,000 to the pound. Straight embryo surrounded by food.

Germination: May germinate after 2 years if stored in glass jars at 41°F. Normal germination about 60%, but treated seed may germinate better and more quickly.

Seedling: Seed and cotyledons above ground reaching 1-inch high in 2 days and first leaves showing about 1 month after germination starts.

Echo Park Dam Threat

★

An Editorial

★

As THIS is being written the Subcommittee on Irrigation and Reclamation of the House Committee on Interior and Insular Affairs is concluding extensive hearings on three identical bills that would authorize and implement a start on the Colorado River Storage Project. These bills—H.R. 4443, 4449 and 4463—have been filed by Congressmen Aspinall of Colorado, Dawson and Stringfellow, of Utah. These measures propose several major projects, and a number of participating constructions, and would include Echo Park Dam in Dinosaur National Monument.

Large delegations from Utah and neighboring States came to Washington for these hearings. They based their case on the unquestioned need for water storage for power and irrigation. They contended that Echo Park Dam is an essential part of the program. Conservationists take exception to this, asserting that this dam is an unwarranted invasion of the National Monument, and that alternative sites are not only practicable but desirable.

Historically the Echo Park Dam controversy has been raging for some years. The construction was first put forward by the Bureau of Reclamation. It was made the subject of special hearing by the then Secretary of the Interior, Oscar Chapman. It was tentatively approved by him, then removed from the program, and, finally, recently approved by Secretary of the Interior Douglas McKay. This latter action places the matter before the Congress.

This latest threat to the integrity of one of the areas under the administration of the National Park Service has mobilized conservation organization and conservationists in opposition to the plan. This is not, however, opposition to the Colorado River Project, otherwise, because the need for water storage is obvious.

In pleading for the preservation of the National Monument its defenders have been at a certain disadvantage because the area has thus far been relatively little visited. This has been due primarily to the fact that no funds have been available with which the National Park Service could make this outstanding area reasonably accessible. Nevertheless, recent publicity about the controversy has attracted an increased number of visitors, and, of course, an increased number of people who realize the importance of preservation of the Monument.

The fight for the construction of this dam centers, in no small measure, about the community of Vernal, Utah, which sent a considerable delegation to argue for Echo Park Dam. Naturally, a substantial temporary boom is anticipated for Vernal if this $165,000,000, plus, project is carried out. However, a boom of permanent duration might be anticipated if the Monument were made accessible and Vernal became the entrance-way, year after year, for more and more visitors.

Faced with this threat, conservationists have gone thoroughly into the whole proposal. General Ulysses S. Grant III, engineer and President of the American Planning and Civic Association, has studied the project and presented alternative proposals that apparently raised serious doubts about the Echo Park site in the mind of former Secretary Chapman. Also, the Corps of Engineers raised serious questions concerning details of the Bureau of Reclamation plans, in particular Echo Park. These viewpoints were presented to the committee of Congress.

Thus the case against the inclusion of this particular site on the grounds of dangerous precedent in the invasion of a National Monument has been bulwarked by competent presentation of alternatives. If it could be demonstrated that the success of the Colorado River Storage Project hinged upon the erection of Echo Park Dam, it might be difficult to defend the Monument from exploitation. However, not only does the project not hinge upon this site but it can be shown that, from the viewpoints of economics, expense and engineering, Echo Park could as well be eliminated in favor of alternative locations.

So far as we are concerned we are not competent to render any engineering opinions, although we believe that the authoritative view opposed to this dam is sound. It is enough for us that Echo Park Dam—and Split Mountain Dam site, also within the Monument, and which is also projected but not included in current proposed legislation—would invade an area of incomparable value in our system of National Parks and Monuments. That is sufficient reason, from our viewpoint, for the Congress to eliminate Echo Park Dam from the pending bills.

Thirty-three years ago, as a member of the staff of *The Christian Science Monitor*, we wrote a series of articles in a fight to defend the Yellowstone River, and Yellowstone National Park, from a fate now prescribed by the Bureau of Reclamation for Dinosaur National Monument. That earlier threat was turned away, as have been other similar assaults upon the National Parks during the intervening years. We trust that the Congress will not sully the record.

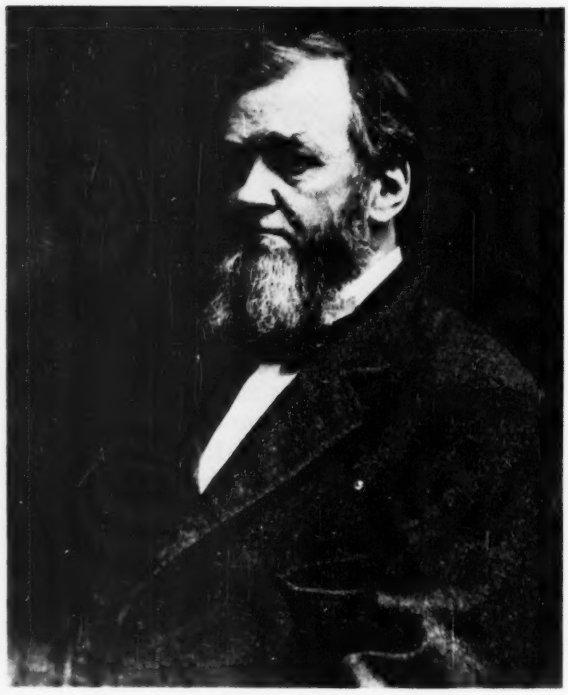
Spencer Fullerton Baird

By W. L. McATEE

TO USE a colloquial expression, "his middle name was work"; and changing the last term to "hard work" would make it more truly descriptive of Baird. Although well above the average in physical endowment, strain, possibly from over-ambitious field excursions, produced a dilation of the heart, which was diagnosed at the age of sixteen, and which was a handicap through most of his life, and the cause of his final illness. Nevertheless, he was a picture of robust manhood, the embodiment of purpose and energy, and he labored prodigiously.

Born at Reading, Pennsylvania, February 2, 1823, Baird had a good inheritance, a wholesome home life, and, despite some maintenance difficulties, a good education, graduating from Dickinson College at Carlisle, Pa., when seventeen. Two years earlier he had begun to keep a weather record to which he soon added notes on birds. An older brother, William M., had already formed a collection of local game birds, and together the brothers undertook to collect a complete series of the birds of Cumberland County. Among their specimens were two small flycatchers, which they could not identify. In June, 1840, Spencer wrote to John James Audubon about them, enclosing descriptions and measurements. Audubon was then preoccupied with mammals and asked Baird to contribute specimens of the smaller species. However, the brothers stuck to their bird work and in 1843 published descriptions of the two species of flycatchers, supposed to be new. They were, indeed, new and they appear in the latest *Check-List of North American Birds* as: *Empidonax flaviventris*, the yellow-bellied flycatcher, and *Empidonax minimus*, the least flycatcher, the authorities for both being Baird and Baird. William, educated in Law, went into that profession and gradually withdrew from natural history work. But Spencer ransacked the country and studied almost everything—plants, insects, frogs, fishes, in fact the whole range of vertebrates; and also fossils from the bone caves of the region.

In September, 1840, following his graduation, Spencer visited the Academy of Natural Sciences in Philadelphia, where he met several leading scientists. There he had his first view of Audubon's great folio on birds. He had previously enjoyed access to Alexander Wilson's *American Ornithology;* indeed the college library at Carlisle was rich in the literature he needed. He supplemented its stores by borrowings from the State Library in Harrisburg, walking twenty miles each way for the purpose. He began reading in Medicine and



Spencer Fullerton Baird, 1823-1888

in October, 1841, left for study in Bellevue Hospital, New York. More important for his career, however, were the acquaintances formed with fellow naturalists, with some of whom he afterward collaborated. He met Audubon, who gave him lessons in drawing and coloring and also "a pretty clever present" of his five-volume work, that is, the *Ornithological Biography*.

Spencer Baird's first visit to Washington was in July, 1842; there he was specially interested in the libraries and in the Museum of the Patent Office, where the collections of the Wilkes Exploring Expedition (to the South Seas, 1838-1842) were coming in, and in those of the National Institute, which were rapidly growing. In that year, at the age of nineteen, he was elected a Member of the Institute and also a Corresponding Member of the Academy of Natural Sciences of Philadelphia.

In 1843 he was invited by Audubon to go on the Missouri River Expedition and was eager to join, but objections by female relatives on the score of probable dangers in the West, and of risks involved because of his heart palpitations, dissuaded him. He remained at home, studying and teaching, and received the A.M. degree from Dickinson College. In the same year he made another trip to Washington, where he completed the list of Cumberland County birds and arranged for its publication. It appeared in 1844 as the joint preparation of the Baird brothers, but was re-issued by Pennsylvania College at Gettysburg the next year, with Spencer as sole author.

Thomas Mayo Brewer, leading oologist, visited Baird at Carlisle in 1844 and they collected many eggs. Spencer wrote of the occasion, "I think he was pleased

with his visit; we all liked him very much." Brewer was instrumental in Baird's election as Corresponding Member of the Boston Society of Natural History in the same year, and nearly thirty years later joined with him (and Robert Ridgway) in preparation of one of the great works on North American birds.

Again traveling in 1845, Baird renewed contacts with Cassin in Philadelphia and with Lawrence in New York (both collaborators of the future). On this visit, Baird was permitted to take anything he wanted from Audubon's duplicate birds and got representatives of about forty species additional to his collection. At this time, to house his growing mass of specimens, he built a combined workshop and museum in the backyard of his mother's place. In the same year, at twenty-two years of age, he was appointed Honorary Professor of Natural History and Curator of the Cabinet of Dickinson College, and was elected a Member of the Entomological Society of Pennsylvania.

Spencer Baird and his brother were the first to describe the least flycatcher, *Empidonax minimus*.

At the college a salaried position, Professor of Natural History and Chemistry, was established for him in 1846, and he was elected to the New York State Lyceum of Natural History and to the American Society of Geologists and Naturalists. His travels extended to Boston, permitting reunion with Brewer, and to New Haven where, in the Yale Library, he consulted books not accessible to him before, besides meeting in both places additional naturalists and other scientists. Philadelphia and New York were not neglected and while at the latter place, Audubon told him to take any birds at all from his collection—a princely gift, including type specimens. It is evident that Spencer Baird made a good impression, exerted great influence for one so young, and was laying the foundations for a great career. With it all, he continued to work as most other men no more than dream of working.

His college teaching included field excursions—a new thing in American practice—in which he preceded Louis Agassiz, who is usually credited with the innovation. At this time he was making a special study of fishes and a collection of their skeletons, cleaned by tadpoles. This work also grew in significance with the years. He became acquainted with Agassiz, who proposed cooperation on a monograph of American fishes. However, this proved to be too great an undertaking in addition to their other projects and, after some years of delays and interruptions, was dropped by mutual consent. Nevertheless, in time, fishes occupied Baird more exclusively than any of his earlier favorite subjects.

In 1847 he was recommended as curator in the Smithsonian Institution, but Joseph Henry, Secretary, told him that no one would be appointed until the building was in proper condition, probably not under five years. The next year he visited Henry and got an allowance to cover the cost of drawings to illustrate some of his researches. There was also an allotment of $75 for collecting fishes in western Virginia, evidence of continuing close relations with the Smithsonian.

Along with such expeditions, intensive collecting of cave fossils, and his college teaching, he was translating and editing an American version of Brockhaus's *Bilder-Atlas*—a task that extended over nearly four years. Correspondence in connection with this work broadened his acquaintance with scientists and made him, next to Agassiz, and at the age of only twenty-seven, the most widely known man of science in America. The results of the Atlas undertaking were published in 1852 as *The Iconographic Encyclopedia*.

Baird wrote to Secretary Henry in 1849, urging the addition of natural history collections to the objectives of the Smithsonian Institution, but still the building was incomplete and was deemed to have priority. But Baird was assured that he was Henry's choice for Naturalist in the Institution, and was told that in due time he would be nominated for consideration by the Board of Regents. In 1850 he was appointed Agent under the Smithsonian, authorized to prepare instructions for collecting natural history specimens, take charge of the making of such collections, and to request cooperation of such Army, Navy, and other personnel as he thought desirable. Thus began the collecting program that he afterwards carried to such an outstanding success.

Then in July, at the age of twenty-seven years, three months, he was elected Assistant Secretary of the Smithsonian Institution and Keeper of the Cabinet. His collections, filling two freight cars, were shipped to Washington and stored in the basement of the Smithsonian Building. Unpacking and arranging them, as well as older and currently received collections, were personal duties of the Assistant Secretary, as was also all correspondence, in his own hand, and at the rate of about ten letters a day. In a missive dated some six months later, he wrote: "In addition to my Natural History operations, I have entire superintendence of

the publishing department, revising memoirs, fighting printers and engravers, correcting proof, distributing copies, etc. I also have charge of the . . . exchanges, domestic and foreign." By contrast, modern administrators do not know what work is.

Yet there was a lighter, a social side of life. Young naturalists, studying the collections, were lodged in tower-rooms of the Smithsonian, and on Sunday evenings gathered in the Baird home to meet men distinguished in science, or in the military services, and to hear discussion of affairs of interest.

Baird pushed his campaign for volunteer collecting and was able to make considerable progress despite the approaching threat and final prevalence of civil war. Valuable collaborators were developed among military officers, especially those of the Army Medical Corps, and among the personnel of government exploring expeditions in the West. These included some who had been his students at Dickinson College and also employees of the Hudson's Bay Company, who made most valuable contributions.

He did everything he could to supply these men with proper equipment, to encourage them by personal attention, and to reward them with books, magazines, and other gifts at his own expense. His daughter, Lucy H. Baird, wrote of these proceedings: "No bride ever devoted more thought and attention to her trousseau than did father to the fitting out of each of these explorers, and he watched the progress of each with anxious personal interest. The reward of his labors came in enormous collections sent in, sometimes more than could easily be handled." No source of possible additions to the Cabinet was overlooked. Baird was able to transmit to others his own great enthusiasm and he built a collecting organization that yielded results for many years.

Among the contributing expeditions, none was more important than the "explorations and surveys to ascertain the most practicable and economical route for a railroad from the Mississippi River to the Pacific Ocean," made in 1853-1854, the reports on which were published in twelve quarto volumes (1855-1869.) Baird provided accounts of the mammals and reptiles, and, in collaboration with John Cassin and George N. Lawrence, of the birds. There were also reports on birds of some of the separate routes by Baird and other authors, one of them a former student, C. B. R. Kennerly. These contain descriptions of new species and are illustrated by colored plates, while the main report on "Birds" (Vol. IX, 1858) was not illustrated.

To that account Cassin contributed about 135 pages, and Lawrence 80, out of a total of more than a thousand, the remainder being by Baird. This work embodied synonymy and a revision of the major groups upon which he had been working for years, as well as the first modern-type catalog of the species. Elliott Coues, our greatest ornithological bibliographer, wrote of this work, that: "It represents the most important single step ever taken in the progress of American ornithology in all that relates to the technicalities," and, he continued, "The appearance of so great a work from the hands of a most methodical, learned, and sagacious naturalist, aided by two of the leading ornithologists of America, exerted an influence perhaps stronger and more widely felt than that of any of its predecessors, Audubon's and Wilson's not excepted, and marked an epoch in the history of American ornithology." The work was re-issued with an atlas of a hundred plates, under the title, *The Birds of North America*, etc., at Philadelphia in 1860.

One may wonder just when the National Museum, which it was Baird's great ambition to establish, actually came into existence. His own collections, valuably supplemented by the Audubon birds, were a nucleus, the natural history spoils of the surveying and other expeditions provided growth and novelty, but it was the transfer from the Patent Office in 1858 and 1862 of the collections formed by the National Institute and gathered by the Wilkes Expedition, that finally made the National Museum. Baird was its head, and as nearly as any one man could be, its creator.

Reverting to his publications, it should be noted that, from 1864 to 1866, Baird issued in parts in the Smithsonian Miscellaneous Collections 450 pages of a *Review of American Birds*. It contains descriptions of numerous new forms, but was discontinued, probably from lack of time on the part of the ever busier author. A memoir presented to the National Academy of Sciences in January 1865 on *The Distribution and Migrations of North American Birds* was variously reprinted, abstracted, and translated in 1866. It treats not only the subject indicated in the title, but also zoological regions, variation of birds in relation to climate, and decrease in size with latitude. It is apparently a summary of his views in philosophical ornithology.

One more great work remained, *A History of North American Birds* by Baird, Thomas Mayo Brewer, previously mentioned in this sketch, and Robert Ridgway, with whom Baird had become acquainted through correspondence beginning in 1864, who was employed in the Exploration of the 40th Parallel in 1867, and by the Smithsonian Institution in 1869, where he developed under Baird and in time became his successor as the leading American ornithologist. Three volumes, in small quarto, on the Land Birds, were published in Boston in 1874, and two on Water Birds in 1884. These books averaged more than (Continued on page 162)

Brewer's Blackbird

By RUTH SEYMOUR VESELY

Bold bird in iridescent sable
With glaring, oddly yellow eye,
You swoop upon the feeding-table
Frightening off the small and shy
And only your dark-eyed, plainer mate
May share the crumbs upon your plate.
Not all the tyrants, I am certain,
Dwell behind the Iron Curtain.

Woodlawn, A Washington Legacy

By HELEN DUPREY BULLOCK

The west front of Woodlawn mansion, showing the circle of original boxwood and a few of the towering trees of the park. Ancient oaks are one of the glories of Woodlawn, and the white oak in the center is more than 150 years old.

WOODLAWN Plantation, once part of the Mount Vernon estate, was presented by George Washington to his foster daughter, Nelly Custis, upon her marriage to his nephew, Major Lawrence Lewis, on February 22, 1799. The General said of the plantation lands, and particularly the hill overlooking the Mount Vernon mansion and a broad sweep of the Potomac River: "Few better sites for a house than Gray's Hill and that range are to be found in this country, or elsewhere."

General Washington's judgment has been reconfirmed after more than a century and one-half, during which time the mansion passed out of family ownership, and even went through a period of emptiness and deterioration. In May, 1953, The Garden Club of Virginia announced that the proceeds of Historic Garden Week, April 24-May 1, 1954, will be devoted to restoration of the grounds and gardens of Woodlawn Plantation. The mansion, built for the Lewises by Dr. William Thornton, first architect of the United States Capitol, is now open to the public under the auspices of the National Trust for Historic Preservation, a non-profit, non-governmental organization with headquarters in Washington, D. C.

It was George Washington who indicated the house site on his survey of the lands presented to the young couple. On Gray's Hill, the survey has a legend in his own hand, "a most beautiful site for a Gentleman's Seat." At the General's insistence, the Lewises remained at Mount Vernon to assist him in entertaining the constant stream of visitors that made him compare his home on the Potomac to a "well resorted tavern."

General Washington died only a few months after making provision for the Lewis's future, leaving them 2000 acres of land, including part of Dogue Run Farm, and the grist mill and distillery. His friend Dr. William Thornton, who had designed several houses for him in Washington and was an intimate friend of the Washington family, was chosen as architect.

The architect's first decision was to go out with Lewis on March 18, 1800, to Gray's Hill to stake out the site. Great care was taken in marking the trees that were to be removed for the house site, and the handsome larger trees that were to be saved. On August 4 of the same year, Mrs. Thornton wrote in her diary,

Lorenzo Lewis, son of Nelly Custis and Lawrence Lewis, was an ornithologist. At Woodlawn some of his bird collection is still displayed, including this red-tailed hawk.

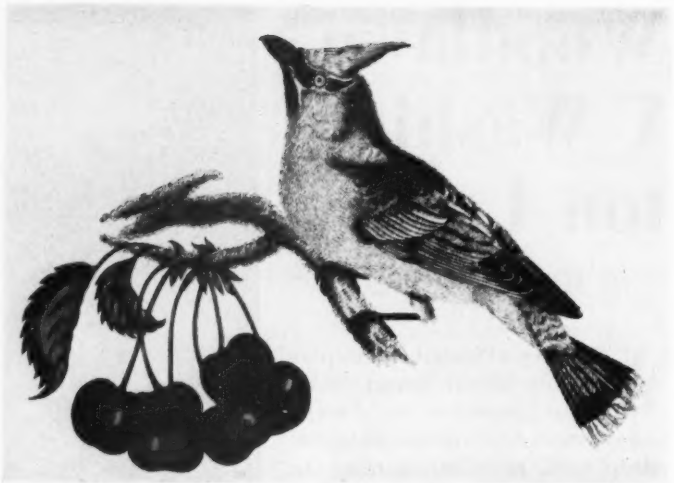
"After breakfast Mrs. Lewis, the youngest ladies & I went in Mrs. Washington's carriage (a Coachee & 4) and Mr. Lewis and Dr. T. in ours, to see Mr. Lewis's Hill where he is going to build—and his farm & mill & distillery. Dr. T. has given him a plan for his house. He has a fine situation all in woods, from which he will have an extensive and beautiful view."

The handsome grove of native trees left around the house site has been reduced with the years, but some fine specimens of oaks, hollies and magnolias from the original garden still remain, as well as a circular border of boxwood. According to later residents, who bought the property from the Lewises, the circular garden was copied from the one at Mount Vernon, and Nelly Lewis planted a large rose garden northwest of the house.

Still preserved at Mount Vernon are family letters telling how the mother and father at Woodlawn, and later the children, enjoyed the beautiful grounds and garden. In letters to her fiance, Charles M. Conrad, in New Orleans, Angela Lewis wrote: "The flowers you were so anxious should grow, look as if they would succeed; Father has made me a frame which stands in the window of a room where there is a constant fire. I am very attentive to them, and I Hope they will flourish." On April 1, 1835, she told him: "I passed a very pleasant time during my absence, but after all there is no place like Woodlawn, and now that the spring has commenced it begins to look sweetly. Father has had the Trees trimmed, and the flowers are beginning to make their appearance, by the middle or last of this month his place will be most beautiful. . .We have Violets and Hyacinths in bloom and some more common Flowers, but no Roses."

The severe winter of 1834 killed some of the finest trees: "Much to my sorrow," wrote Angela, "I always feel in losing a tree as if I had lost a friend, I think there is nothing in the world equal to a fine tree in the summer. I always feel refreshed by looking at one."

The trees, woods, marshes, small springs and streams favored the growth of wildlife. When Lorenzo Lewis advertised Woodlawn for sale in 1846 in the *Alexandria Gazette*, among its other advantages he reported: "This place offers to those fond of field sports and good living peculiar advantages. Deer are abundant on the land, and the Dogue Creek and Potomac River affords the finest fish and wild fowl, among which the famous Canvass-back duck abounds."



An unfinished drawing of a cedar waxwing by Nelly Custis Lewis. It is traceable to a plate by Alexander Wilson. She is believed to have done this as a means of directing the interest of her children or grandchildren toward natural history.

Lorenzo Lewis from his youth became keenly interested in the native Virginia birds and was a talented ornithologist. He collected birds at Woodlawn Plantation and later at his Clarke County home, Audley; mounted them and arranged them in cases. About thirty specimens remain of his collection and are at Woodlawn today. They have proved of great interest to young visitors from Virginia, who can point out the yellow-breasted chat, the pileated woodpecker, the red-tailed hawk, and other familiar birds of the local countryside.

Among the other family mementos now displayed at Woodlawn Plantation is an early drawing of a cedar waxwing drawn by Nelly Custis Lewis. The drawing is an incompleted one, copied from Alexander Wilson's *American Ornithology or the Natural History of Birds of the United States.*

Woodlawn Plantation will be only one of Virginia's historic houses and gardens open under the sponsorship of the Historic Garden Week of the Garden Club of Virginia from April 24 to May 1, 1954. Literature and further details are available through Historic Garden Week, Jefferson Hotel, Richmond, Virginia.

Rain Delay

By JOHN GALLINARI WHIDDING

A tree possesses power
Demonstrably designing
In holding back a shower
Until the sun is shining.

And then, beset by breezes,
To passers' consternation
Dropping on whom it pleases
A vast precipitation.

Jeff's Wild Guests

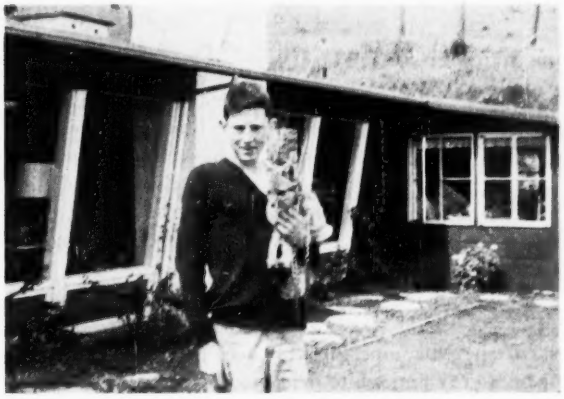
By BERT VAN CLEVE

THERE is no such a thing as a "wild" animal to my sixteen-year-old son, Jeff. Ever since he has been old enough to walk he has had a way with animals. In fact, his special faculty has so intrigued our friends that when we meet them the first question is likely to be: "Who's new in your backyard zoo?"

Our house seems to be a perpetual menagerie. Horse meat is constantly being filched from our good old dog, or our lazy cat, to feed some wild thing that "would just die, Dad, if I didn't bring it home to take care of it."

At the age of three, Jeff gave his best pal a licking because he killed a spider that had spun a home in an outside corner of our breakfast room window. The boy had made quite a pet of the spider, every day catching a fly and putting it in the web for his spider friend's lunch.

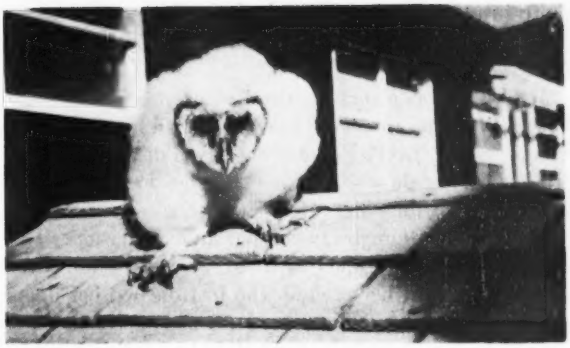
As Jeff grew older he took on larger creatures. Although I have become complacent to most kinds of



Jeff and his female fox pet, who spent two months with the Van Cleve family.

wildlife, I still am not overly fond of field mice, moles and gophers. Once our son had a mole in the drawer of the desk in his bedroom for three days. It might have been there yet had not my dear, unsuspecting wife opened the drawer. When she saw a furry object she shut the drawer in a hurry. The mole was immediately served an eviction notice, so Jeff put him in his pocket and took him to school to the biology teacher, who made him a home in a large goldfish bowl.

One Sunday morning, while my wife and I were still sitting at the breakfast table reading the funnies, our son came in the back door with a happy look on his face and a full-grown but young male fox in his arms. Jeff and his dog had been out for an early morning hike in the hills back of our house. Suddenly the dog went tearing down the hill, barking furiously. Jeff ran after him and found the dog standing nose to nose with the fox, both snarling viciously but neither making any



Bertram, the young barn owl, on the roof of his cage.

move. The fox was so intent that Jeff walked up behind him, grabbed him by the scruff of the neck and folded him in his arms. Amazingly, the fox immediately became docile and allowed Jeff to carry him home without any attempt to escape. We fixed the fox a bed in a carton and he lay there contentedly most of the day, with the three of us petting him any time we passed. That night, however, he chewed his way through two thicknesses of chicken wire to make his escape from a hurriedly constructed cage.

That was not the end of foxes in our lives. Jeff determined to get another and really make a pet of it. Sure enough, a few days later he came in with a three-quarter-grown female fox, not quite as pretty as its predecessor and smaller. This time Jeff was better prepared, having built in advance a cage he was sure was escape proof. He spent all his spare time fussing over that fox, and it was only a few days before he had the fox curling up beside him on the bed each night as he studied his homework.

Of all the little wild things we have had, that fox was really the cutest, and we had her about two months. But she had one frailty that she could not help, and about which we were able to do nothing. In humans, the advertising profession has taught us to call it B.O.; in foxes and other animals, Jeff informed me, it is called musk. At any rate, the odor became more and

The hawk was nursed back to health except for its badly broken wing.

more heady. So, before we had the Board of Health down on us, my wife issued the ultimatum, "The musk musk go."

During the two months she had been our *guest*, we had been trying to decide whether to call her Fontaine Fox or 20th-Century Fox, but she saved us thought and trouble by somehow unhooking the cage door one night and taking to the hills. How she unhooked the door I do not know although my son has an explanation. He says nothing is as smart as a fox, so when she heard we did not want her around, she just opened her door and left.

Our next adventure with our boy naturalist was as a trio of nurses to three very young baby raccoons. Something had killed the mother, and all but three of the litter had died of starvation when Jeff discovered them in a hillside cave. Taking off his Pendleton shirt, he wrapped them in it and brought them home. For the next few days no maternity ward in any hospital ever had a more conscientious crew of baby-nurses. Willingness does not take the place of real know-how, but we tried. My wife bought dolly nursing bottles and nipples at the drug store. They were not very satisfactory, as baby raccoons have mouths almost as big as a platypus, but every time the three little masked bandits made a fuss one of us would quickly shove a bottle of diluted warm milk into each gaping maw.

The baby raccoons, too, had a rare odor. For that matter, it was more offensive than the fox smell. So, I guess it was a blessing for the neighborhood that the milk feeding was not just the correct one needed to pull them through. My son blamed himself, saying he should have known they could not handle fresh milk, but should have had an evaporated milk formula such as he had when he was a baby. We gave the raccoons a decent burial, but we gave Jeff *the word*—NO MORE ANIMALS.

Two days later Jeff came home from school to find a large hawk lying on our front doorstep. One of the neighborhood boys had shot the bird and left it, with a note, asking Jeff if he would mount it for him. As he picked up the bird, the talons of the "dead" hawk suddenly tightened around his fingers. Taking his mother's sewing basket, and several of my woolen socks that were waiting to be darned, he made a nest for the wounded creature.

Next he made a mixture of warm milk and whiskey and, with an eye-dropper, injected a few drops of fluid into the bird's throat. Then he cleaned the wounded eye and broken pinion. He tried to splint the wing but it was such a bad break and tear he was not successful. By the time his mother came home from shopping he had brought the hawk back to consciousness, as she discovered when she opened the hall closet door to hang away her coat. Jeff explained he had put the hawk in the closet because he felt it would be more relaxed in the dark, and therefore recover more rapidly.

In five days he had the hawk walking around the breakfast room trailing its broken wing, and cocking its head on one side to see with its one good eye. Jeff fed the bird chunks of horse meat, which, it took from his hand without taking any of the hand with it. In a short time the bird became strong, and fierce to everyone but Jeff, but the wing just could not heal so as to be used in flight. Jeff would take it out on the front lawn every day to let it walk around or sit on an old stump in the sunshine. Of course he did not dream the hawk would ever leave him, but one day, while his back was turned, the hawk ran up the hill and disappeared into the bushes. We hunted and hunted but could not find it.

Jeff has made his mother a very brave woman. When asked, she will imperturbably feel the softness of the fur on a gray and white field mouse; inspect the sharp snout on a shrew; examine very serviceable hands on the mole's front legs. She has even grown to admire the lithe beauty of a five-foot gopher snake, which, by the way, has done a yeoman's job of keeping the gophers out of our yard.

A reptile of which we all became fond was a chameleon that Jeff bought at the circus. We had it around the house for about eight months. It lived on the drapes over the kitchen window. Jeff used to catch countless flies to feed the little fellow. Whenever it saw Jeff approaching with a live fly it would hurry down the drapes to meet him, and, with a lightning thrust of its long tongue, it would whip the fly into its gullet quicker than you could wink your eye. But one day the screen was left open on the kitchen window and the chameleon took off for places where flies were more common.

Two years ago there was an incident that ruffled my wife's usual composure and I cannot say that I blame her. We were vacationing at one of our favorite spots on the Eel River. The first few days were cool, so we did all our cooking and eating (Continued on page 162)

Protest

By MAE NORTON MORRIS

My voice is so little and still I cry,
While a legion stalks through the wooded hills;
Strong men treading the crisp brown leaves,
Each man boasting the thing he kills.

Sudden terror and frantic flight,
Flashes of fur and feathered darts.
Strong men walking the wooded hills
Bent on the quarry of timid hearts;

Missing the grace of a swinging squirrel,
The glow of beauty in living things,
Greedily lifting a limp, dead form,
Roughly grasping torn, lifeless wings!

My voice is so little and still I cry:
For shame! For shame!
And the echo dies
On the autumn winds low requiem
Under the vault of a silent sky.

Life's Spark in A Pine Seed

By EDWIN A. MASON

BILL Maxant was almost asleep. He had spent a cosy evening at home before the log fire, and the large, rugged-looking pine cone that graced the mantel over the fireplace had started a train of reminiscences, which still lingered in his mind as he lay in bed, half sleeping, half wakeful.

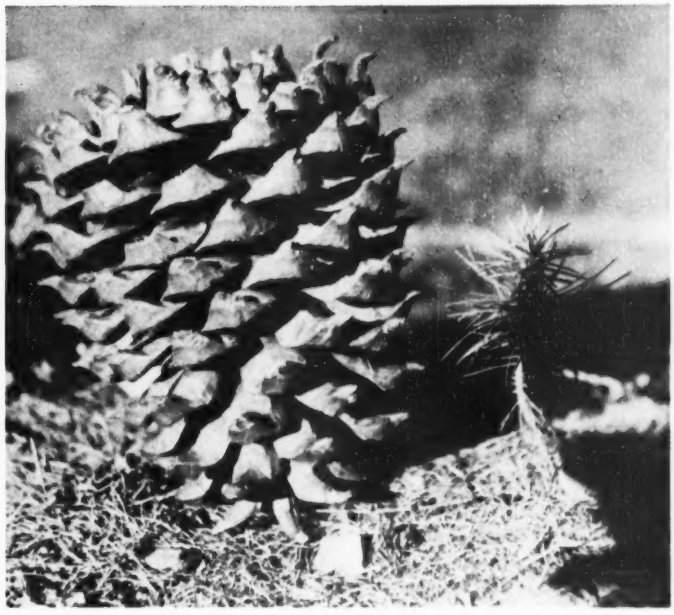
Suddenly he was wide awake; alert. A loud "snap" registered in his mind as he jerked upright, listening. A second, almost explosive, snapping sound, which followed after an interval of silence broken only by the alarm clock, had him out of bed. As he shuffled into his slippers, he muttered: "Sounds like the house is on fire."

The living room was dark as he entered. Through the fireplace screen a winking red eye showed where the last live coal was trying to stay alive in the bed of dead ashes. Bill Maxant switched on a light as he walked over to the fireplace. He stood there, listening intently, one arm resting on the mantel. He found himself gazing at the big, brown, pine cone he had carried across the continent as a memento of his vacation trip through the mountains of California.

This pine cone meant a lot to Bill Maxant. It had not been bought in a curio shop. Every time he looked at it, he remembered vividly his first sight of it. He pictured the stretch of trail, winding up to the hazy blue of the distant Sierra. He recalled how the rythmic clip, clop of the horse's hoofs on the trail was suddenly broken as something came crashing down through the pine branches, to land with a dull thud only a few feet from his mount. It was large, and dark greenish-brown in color as it lay there.

Quieting his horse, Bill Maxant dismounted. Holding the bridle in one hand, he stooped and picked up the object that had so closely missed hitting him. He was surprised at its weight, and puzzled. Puzzled because neither he, nor any of the party, could think of a good reason why the cone should so suddenly break away from the branch, and come hurtling to the ground. While it was obviously fully grown, its greenness indicated it was not yet ready to fall. In fact, many cones remain on the tree long after becoming brown and completely dry.

As Bill stood at the fireplace, looking at the cone, and wondering what had made the loud snap that had brought him out of a warm bed, another, more intense "*snap*" broke the stillness. This time there was no doubt about it, because it originated within a few inches of his ears, which were close to the mantel.



PHOTOGRAPH BY ALFRED F. GRAY

After the cone of the digger pine had gathered dust on a mantel for seventeen years, one of its seeds produced the little seedling at the right.

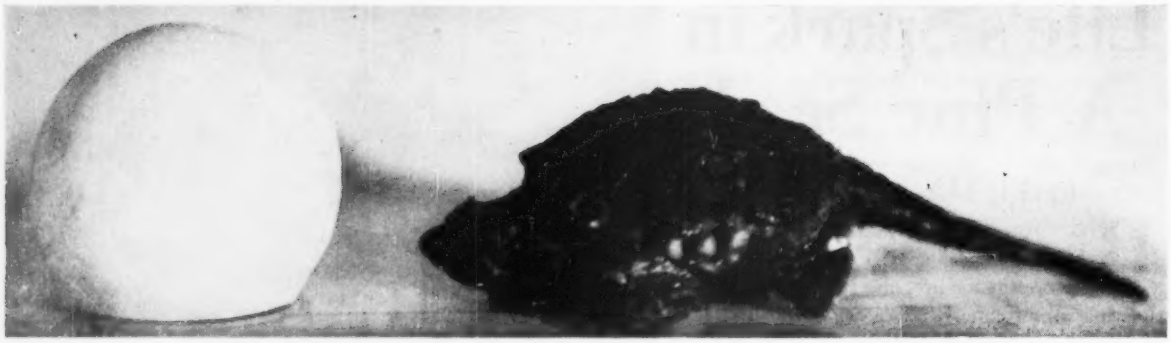
"Ah, so that's it." Bill Maxant had solved the mystery. He reasoned that the warmth from the fire had dried out his prized cone. The scales were behaving as they do under warm, dry conditions. They were opening, so that the seeds within could disperse. As he looked more closely at the cone, he noticed that its original greenish color had given way to a rich, glowing brown.

Stepping back a couple of paces, Bill Maxant felt pleased with the appearance of the mantel shelf. He was more sure than ever that his memento of the California mountains belonged *right* where it was, right in the center of the mantel over the fireplace in his home at Harvard, Massachusetts. It was the perfect reminder of happy days spent some 3000 miles away in the mountains of California.

Seventeen years later, the gleam had completely gone from the rich brown surfaces of the heavy scales of the pine cone. The dust of the years had become too much for an orderly housekeeper. The edict was: "That cone must either be discarded or cleaned." Sentiment won out; it was taken down, and cleaned.

Several large, brown seeds rolled out during the cleaning operation. Because of their unusually large size, they were shown to Henry Phelps, in the neighboring town of Groton, whose hobby is growing evergreens. He asked for the chance to grow them, just for the fun of it, not expecting too much from seeds that had lain dormant and dry for seventeen years.

But the spark of life dies hard. Planted without stratification in regular garden soil outdoors, three seedlings eventually came (Continued on page 164)



A baby snapping turtle just out of its egg. Beside it is another snapper's egg, slightly larger than natural size, which proved to be infertile.

Hatching Reptile Pets

By BARBARA HUNT

NEWLY captured reptiles are often pathetically unhappy. Turtles may paw steadily at the sides of their tanks, and lizards may ignore succulent caterpillars that they would normally accept with enthusiasm. Considerable time may be required for them to adjust themselves to the loss of their freedom, and their adjustment may never be complete.

One solution to this problem is to acquire one's reptile pets before they have had opportunity to become accustomed to unlimited freedom, preferably before they are born, or hatch from their eggs.

Hatching an American chameleon egg and two turtle eggs, we acquired three satisfactory pets. The chameleon egg was an unexpected bonus produced by a three-legged chameleon shortly after she arrived by mail. There were originally two eggs, laid four days apart. The first egg, which was delicately speckled with green, did not hatch. The second egg was speckled with brown, and was slightly larger and not symmetrical. The chameleon eggs had leathery shells, but at first were quite firm to the touch. As they developed they swelled considerably and became soft and rubbery.

When we saw the first egg lying on the bottom of the cage, we were doubtful what to do with it; then we decided to cover it with damp moss, so that the egg could be inspected daily without undue disturbance. Taking a wide-mouthed jar, we filled it three-quarters full with sand. The sand was then watered until it held as much water as it could without any puddles being formed on its surface, and the egg was laid on the wet sand and covered with a pad of well-dampened moss. The lid of the jar was punctured with fine holes for ventilation, and it was placed on the window sill with our potted plants, where it would be heated by the morning sunshine, and remind us to water it. A few days later the second egg was placed with the first.

Although we consulted all the books on reptiles at our public library, we were unable to obtain any information on the average incubation period of chameleon eggs. As the weeks passed we became a bit careless, and, although the moss was dampened daily, the sand gradually became less damp, and as a result the first egg dried out too much and became dented.

We hoped to see the second egg hatch, but that hope was not realized, for one day a baby lizard almost jumped out of the jar when the lid was unscrewed.

The little lizard had hatched on the forty-third day, and when we first saw her she was wet, almost transparent, and had a small amount of yolk material still attached to her underside. She seemed excited and anxious to escape from her cramped quarters.

Soon "Lulu" was transferred to her private plexiglass-fronted cage. We were not sure that chameleons may eat their young, so were taking no chances. Inside the cage the lizard continued in a frenzy of activity, jumping from branch to branch, and rubbing her nose across the plexiglass as though trying to force an exit. During the first day Lulu was wilder than the adult lizards had been at first, but she gradually began to quiet down.

On the second day two small, live flies were put into her cage, but although she rushed at them repeatedly, she was unable to catch them.

Chameleon eggs shown beside a postage stamp for size comparison. The egg on the right has taken on moisture and swelled; the other dried up and did not hatch.

Then she became discouraged and would try no more. Apparently a chameleon's skill at catching insects is partly acquired. At this point we became worried, for Lulu was very thin. But next day she dealt successfully with two small "daddy longlegs" and a leafhopper.

Soon she was also eating flies, small caterpillars, and even small grasshoppers. Then one day we found that Lulu would also eat horseflesh if a small morsel of it is placed on the end of a thread and put in motion. In fact she will often turn down live food in favor of horseflesh. This is helpful with a chameleon living in Michigan, where not many insects are available during the winter months.

Three snapping turtle eggs were given to us early in July. Baby "snappers" hatched from two of the eggs. The third proved to be infertile.

We buried the eggs in sand in our backyard, choosing as sunny a spot as we could find. A simple corral made of four boards with a screen wire top protected the eggs from animals, and would have prevented the baby turtles' escape had they hatched out unexpectedly.

At intervals of several weeks we dug up an egg and candled it. We could clearly see networks of blood vessels and dark shadows that were slightly larger each time we looked at the eggs. When the shadows had grown to a fair size, we brought the two good eggs into the house, and put them in the "hatching jar," which had just been vacated by the chameleon.

Finally, on the sixth of September, we found one turtle completely hatched. We were amazed at the great amount of unabsorbed yolk still attached to him. He was sluggish for several days until this yolk had almost disappeared. Then he began to show interest in his surroundings and ate his first bite of horseflesh.

On the same day that the first turtle hatched, a small slit appeared in the second egg, but during the next twelve hours no further progress was made. Had the turtle died in the egg? With tweezers we lifted up a flap of shell and peered inside. On one side of the interior was the baby, and while we watched it made a slight movement. On the other side was the yolk material, so much of it that it seemed apparent that the turtle had begun to hatch prematurely. We surrounded the egg with damp moss again and hoped for the best, without being too optimistic. Next morning the turtle stuck its head through the peep-hole, but by late afternoon there was no change except that the head drooped in exhaustion. Then we took tweezers and broke away the upper half of the egg shell so that the turtle rested comfortably cradled in the lower half, except for its head and neck, which lay stretched out on the damp moss. It was almost motionless save an occasional gasp for breath. A light bulb provided extra warmth at this time.

Next morning found the turtle still alive, but showing no improvement. We wondered why it did not make some attempt at crawling. Then, looking more closely, we saw that there was still a transparent membrane stretched tightly over the turtle's back and hind legs. It was difficult to remove, but when the turtle's hind legs were thus freed, the little creature began to push with them, and with just a little help was soon out of the shell.

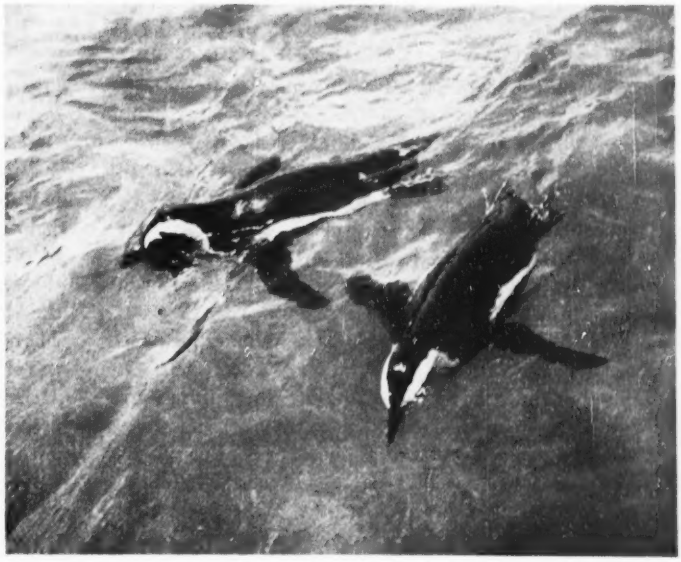
For a few days it was weak and continued to breathe in gasps. Then it suddenly became normal, and soon the turtles were indistinguishable one from the other. Both are voracious eaters, and neither has made any attempt to escape.

★

A Penguin Swims

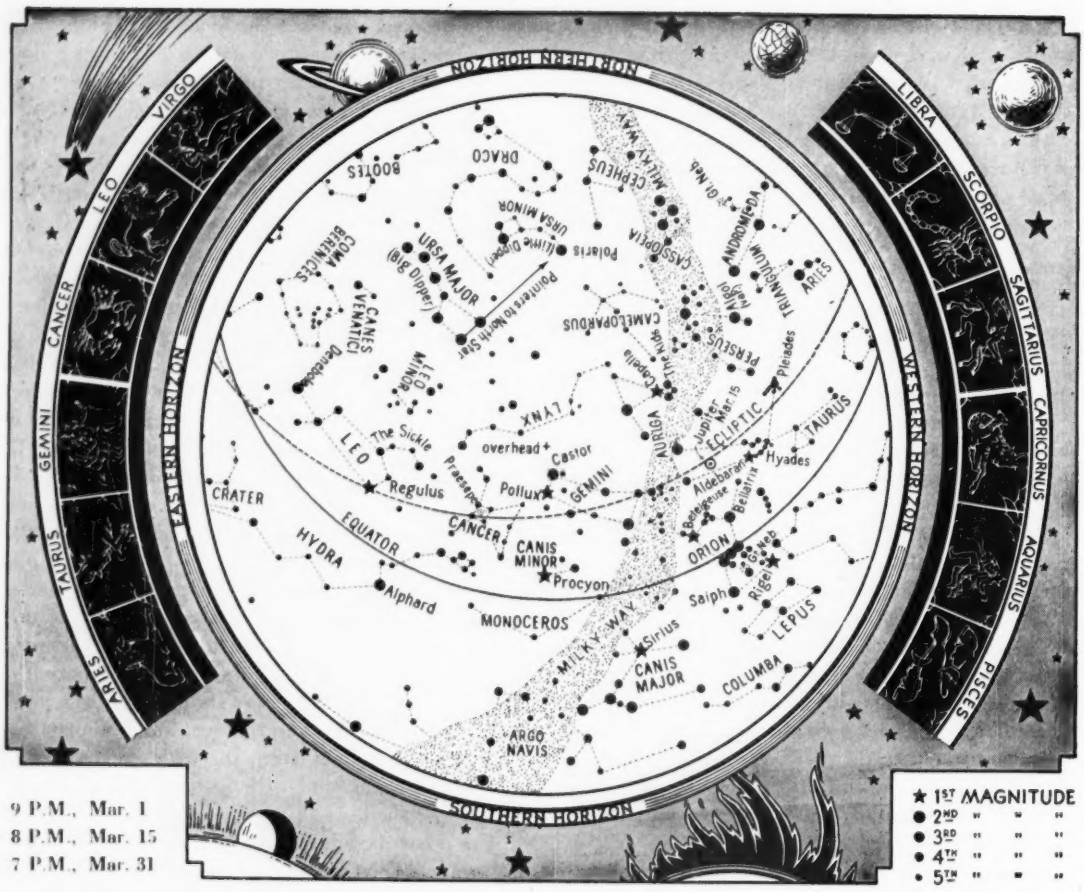
By HUGO H. SCHRODER

Photograph by the Author



WHILE a penguin cannot fly like most birds do, its wings are equipped for swimming. These birds are really in their element in the water, and in their native regions, spend little time on land. There is a scaly covering on the penguin's wings, and the wing bones are flattened to make better paddles. The feet are used as a rudder.

This photograph here was taken at the Marine Studios, Marineland, Florida. The two penguins swam near the top of the water just below me so I could point the camera down on them.



To use this map hold it before you in a vertical position and turn it until the direction of the compass that you wish to face is at the bottom. Then, below the center of the map, which is the point overhead, will be seen the constellations visible in that part of the heavens. It will not be necessary to turn the map if the direction faced is south.

Jupiter and His Family

By ISABEL M. LEWIS

JUPITER, the giant planet with a mass two and one-half times that of all the other planets combined, has a family of satellites, twelve in number, so far as is now known. Saturn is a close rival, with nine satellites and a magnificent ring-system.

None of Jupiter's satellites was discovered without the aid of a telescope; and two of them have never been observed *visually* with a telescope, but have been discovered on photographic plates taken with the 100-inch Mt. Wilson reflector. So far they have been observed only in that way.

The four most important satellites of Jupiter are known as the Galilean satellites, or by their names—Io, Europa, Ganymede, and Callisto. More commonly they are called Satellites I, II, III, and IV, in the order of distance outward from the planet, which is also the order in which their mythological names were given. These four satellites were the first of all celestial objects to be discovered. It was on January 7, 1610, that Galileo made the discovery of the existence of four satellites of the planet Jupiter. The astronomer used a small telescope he had made himself the preceding year. With it he discovered, also, the phases of Venus, lunar mountains, sunspots, and stars in the Milky Way. But Galileo was sorely puzzled by the protuberances to either side of the planet Saturn. These his crude telescope was unable to resolve into the rings of Saturn. He finally became so exasperated at his lack of success that he refused to observe that planet any longer and died unaware of their true nature, or of their temporary disappearance when viewed edgewise.

On the day following the discovery by Galileo of the four satellites of Jupiter, the German astronomer,

Simon Marius, discovered them independently, although his discovery was long discredited. He published tables of their motions, and it was he who gave them their fanciful names from mythology. These satellites of Jupiter are as large as, or larger than, our own moon, and, in fact, Satellites III and IV are larger than the planet Mercury. Were it not for the glare of light from Jupiter the two largest and brightest of these four could be seen as faint stars without telescopic aid. All four of them have periods of rotation equal to their periods of revolution around the rapidly rotating Jupiter, so that, like our own moon toward the earth, they always keep the same side turned toward the planet. Their periods of revolution around Jupiter range from 1 day, 19 hours for Satellite I, to 16 days, 17 hours for Satellite IV, and their mean distances from Jupiter vary from about 262,000 to 1,170,000 miles. Since their orbits are nearly circular, and lie nearly in the plane of Jupiter's equator, they move around the planet in the same direction in which it rotates, from west to east, and nearly in the same straight line.

One of the most interesting of all celestial phenomena to observe telescopically is the continual change in the positions of these four satellites relative to the huge, rotating globe of the planet, with its many diversified features, All national Almanacs predicting the positions of the planets, sun, moon, and interesting celestial phenomena, give data for observing the positions of these satellites with respect to Jupiter for every day they are observable. When one of these satellites passes between us and the surface of the planet it may be seen projected against markings on the surface of the planet as it "transits" the disk. Frequently, too, its shadow will also be seen as a small black dot crossing the face of the planet. These are "shadow-transits." Occultation of a satellite occurs when the satellite passes behind the planet, as seen from the earth, and disappears for a short period. Eclipses of the satellites also occur when they pass into the shadow of the planet.

All these ever-changing phenomena are most fascinating to observe, even in small telescopes. In moderate-sized telescopes the four satellites show disks of appreciable size. These reveal markings, and variability of light under certain circumstances. One never knows when Jupiter is brought into the field of view of the telescope where these four satellites will appear with respect to the planet. Rarely will all be seen on one side of the planet. One or more may be invisible, in eclipse or occultation, or one of them may be in transit across the face of the planet, or in almost any possible arrangement relative to the planet or one another. Even one who posseases a very small telescope may enjoy the sight of all these varied phenomena presented by the four Galilean satellites, from the active little Satellite I, moving rapidly back and forth from one side to the other of the huge planet, to the more sedate and much slower moving Satellite IV, which is so distant from Jupiter that its varied phenomena of transits, occultations, and eclipses are of least frequent occurrence for any of these four satellites.

Nearly three centuries passed after Galileo's epoch-making discovery before another satellite of Jupiter was discovered. Then, in the year 1892, E. E. Barnard, in a search for additional satellites of Jupiter at Lick Observatory with the 36-inch refractor, soon found a small body estimated from its brightness to be about 150 miles in diameter and nearer to Jupiter than Satellite I. This Satellite was named Satellite V as it was the fifth to be discovered. It is the most rapidly moving of all satellites. It revolves around the planet nearly in the plane of its equator in a period of about twelve hours, which is only two hours longer than it takes the planet to rotate on its axis.

Satellite V was the last satellite, up to the present time, to be discovered visually in a telescope. All of the satellites discovered since 1892 have been found on photographic plates, either as a result of a planned search or accidently while photographing other small known satellites of Jupiter with the most powerful telescopes. All of them have been given Roman numerals from Satellite V on in the order of discovery, and not of distance outward from Jupiter. Only the four Galilean satellites were numbered in order of their distance outward from Jupiter.

All of the known satellites of Jupiter fall into three groups. The group nearest the planet includes Satellite V, distant about 113,000 miles from the planet's center, and the four Galilean satellites, the most distant of which is about 1,170,000 miles from Jupiter. Although Satellite V is a tiny body compared to the four Galilean satellites, it is larger than any of the satellites that have been discovered after it was found.

At a distance of about 7 million miles from the planet are Satellites VI, VII, and X. The first two were discovered by Perrine at Lick Observatory with the 36-inch Crossley reflector in December, 1904, and January, 1905, respectively. Each one takes about 260 days to revolve once around Jupiter. Although discovered photograpically, Satellite VI is about 100 miles in diameter and could have been observed visually with the same telescope. Next to Satellite V it is the largest of Jupiter's small satellites. Satellite VII is estimated from its brightness to be only about 35 miles in diameter. Satellite X, the most distant from the planet of the three (Continued on page 164)

Winter Matter

By RAY ROMINE

I contemplate Orion's toe,
  Where Rigel's white-hot blaze
Forces its celestial show
  Through the starry maze.
I think upon the awful heat
  Of this new-forming sun,
And touch the stuff beneath my feet,
  For star and snow are one.

The School Page

By E. LAURENCE PALMER

Professor Emeritus of Nature and Science Education, Cornell University, and Director of Nature Education, The American Nature Association

WOODY PLANT SEEDLINGS IN SCHOOL

MARCH 15, 1954, will be the ninety-sixth birthday of Liberty Hyde Bailey, one of the greatest horticulturists of our time. After his retirement from university administration he started, beside his home, a unique herbarium. In 1937 this was designated as the Bailey Hortorium. It has since been identified with the collections of plants at Cornell University.

It is appropriate that we refer to this collection on this page, not only because of Professor Bailey's birthday this month, but because his collection had a number of features not common in those that preceded it. Most herbarium collections consist of dried specimens of the parts of adult plants or of an entire plant. Usually, these plants are wild plants and not those that we keep under cultivation. Dr. Bailey not only started a collection of plants to be found under cultivation, but he also started making the sheets representative of the species show the adult plant and its appearance through the major stages in its development. If he raised the plant from seeds purchased in a packet he fastened to the page the container in which the seeds came, and some of the seeds that he did not plant. Then, as the seeds germinated and showed above the ground, he would add samples of a few of the seedlings. From time to time, as the plants developed, specimens would be taken, so that finally he had specimens that represented most of the stages in the life history of the plant involved. Few herbaria have followed this pattern, and, yet, if we are to know our plants, we must know them as they appear the year around and throughout their life histories.

Schools might well celebrate this March 15—the ninety-sixth birthday of the man who has done so much for us in helping to understand Nature—by starting a collection of plants following the pattern outlined above. In the lawn in front of your school there are probably many seeds and fruits that have fallen from the branches of your shade trees. Some of these will germinate in the next few weeks. Why not collect a few of the seeds, fruits and seedlings and start your collection right away. It may be some years before these woody plant seedlings will reach sufficient maturity to bear flowers and fruits themselves, but recognition of this fact should do much to help youngsters get a greater appreciation of the time element back of the production of woody material used so generously in our environment. We hope that the special insert in this magazine will be of some use in helping you identify the seedlings of your own front yard.

Of course, you might go out this spring and collect as many of the seeds and fruits of wild woody plants as you can, and try to cultivate the seedlings yourself. The old "rag-doll tester" used in testing corn may well be called into play in making such a study. This consists of some cloth, such as old sheeting, rolled into a doll and kept moist. The seeds or fruits to be germinated are placed inside the doll. Such an experience will not only be useful in identifying the seedlings that come from the fruits or seeds, but may give some idea of the percentage of the seeds and fruits that actually germinate. To help you get some idea of what to expect along this line we have given some rough figures of the average germination to be expected of the 42 different species considered. It might be interesting to let the children go through the insert and place the species roughly in the order of the percentage that might be expected to germinate, and then see if their findings are somewhat similar. Certainly we cannot expect the fruits of tulip tree to show as high a percentage of germination as we find in staghorn sumac, if we believe what we are told here. Try to germinate 10 staghorn sumac fruits and 10 tulip tree fruits to see if you get similar percentages with these two species.

All sorts of classifications may suggest themselves to an alert teacher or pupil. How many of the woody plant seedlings to be found in your front yard produce cotyledons or seed-leaves that are straight as they come from the old seed coat? How many of them raise the seed above the ground during the process of germination? How many of them produce cotyledons that show little green matter? How many of the seedlings show a deep taproot as contrasted with those that produce a finely branched series of roots as a starter? How many of the seedlings seem to be eaten by snails, chipmunks and other small animals? How many of them seem to die suddenly if they grow exposed to the bright sun? How many kinds seem to die if they remain in soaking wet ground the first few weeks of their lives? These and other questions, if answered, will do much to help you understand the interesting ways of woody plant seedlings.

While making these studies of the seedlings this spring remember that I, too, will be making special studies of the seedlings of herbaceous plants for consideration in an insert some other spring. Maybe you will wish to send me some notes and sketches of the seedlings you have observed so that they may be used in that insert.

You might like trying to nibble a few of the seedlings you find to see if they have any particular taste that will help you to recognize them. In doing this be careful not to take too large bites, or not to nibble seedlings found growing near poisonous species. Just a touch of the tongue where the tissue of most seedlings is broken should be sufficient for our needs. It will surprise you how readily you may identify many of the mustards as having a similar flavor.

To germinate seeds for the production of seedlings you may wish to try planting them in moist sand. This may be done by partly filling a shallow box with sand. On this spread a layer of seeds to be studied. On this put a layer of sand and continue this with layers of sand and of seeds. When germination begins the whole box may be emptied gently, and at least some of the seedlings can be set out again if desired. For your purposes it may be better to sow different kinds of seeds in rows in the sand and to cover these rows lightly with moist sand. Then when the seedlings appear they may be described, or herbarium specimens may be made of them.

This last month I have received many inquiries from youngsters asking about things they may do to seek a science achievement award. I have never seen anyone undertake seriously the study of seedlings in seeking these awards. It is something that can be done by anyone, even though it may call for some care in making the initial identifications. But a youngster who might get started in this field might some day produce a report that would fill a gap that is now most obvious in the field of biological literature. I would recommend that, to be valuable, any such study should begin with a group of plants rather than trying to consider all of the plants to be found in the neighborhood.

Should you try rearing seedlings in terraria where the humidity is usually high you may get some beautiful examples of what happens when damping off takes place. The phenomenon is caused by the attacks of a fungus that must have moist air to prosper.

If a few land snails are put in a terrarium in which seedlings are growing, you may find that they show some preference for certain kinds.

To the alert student, light, heat, moisture abundantly or erratically present may suggest influences on seedlings worth investigation. Which thrive with great humidity and which with low humidity? How is humidity measured? At what temperatures do your seedlings do best, and what are the limits that most obviously affect their growth? Which can survive a frost? What effect does the presence or absence of light of varying degrees of intensity have on your seedlings? With these suggestions, I am willing to leave you on your own, assured that you have an interesting and profitable experience before you.

Travel in Space

Space Travel. By Kenneth W. Gatland and Anthony M. Kunesch. New York. 1953. Philosophical Library. 205 pages. Illustrated. $4.75.

This is an illustrated survey of the problems and prospects of travel through space. Starting with the first small beginnings with the discovery of explosive mixture before the birth of Christ, this book brings the reader down to date so far as progress toward conquest of space is concerned. Both authors are technical experts, and Mr. Gatland is secretary of the British Interplanetary Society. Besides being a factual account of what has been learned and what now is possible, this book explores various theories as to how obstacles to spatial conquest can be overcome. As fascinating as fiction are descriptions of how landings might be made on the moon; how artificial satellites might be established and thus serve the interplanetary traveler. The text is in popular terms, and a profusion of excellent pictures add greatly to the interest and value of this book.

Minnesota Mammals

The Mammals of Minnesota. By Harvey L. Gunderson and James R. Beer. Minneapolis. 1953. University of Minnesota Press. 190 pages. Illustrated. Cloth, $3.50; paper, $2.00.

Minnesota's wild furbearers of the past drew many fur traders and pioneers to that State, and its mammal life was important in its development. The wilderness is largely gone, but the State's wild mammal population is still varied and interesting. This book is a guide to that animal population, providing description of the species found, distribution maps and reference data. Earlier volumes on Minnesota's mammals have been published, but they are now out of print, so this latest book fills a gap.

Seton's America

Ernest Thompson Seton's America. Edited by Farida Wiley. New York. 1954. The Devin-Adair Company. 413 pages. $5.00.

While Howard Zahniser intends to review this fine book at greater length as soon as space permits, we should note here its publication. Suffice it to say, for the moment, that we are indebted to Miss Wiley for her judicious selections from the writings of the artist-naturalist, Seton.

Bow Low, My Heart

Bow Low, My Heart. By Ella Elizabeth Preston. Davenport, Iowa. 1953. Published by the author at 1322 East Twelfth Street. $1.00.

This is a most attractive little booklet between the covers of which are collected poems by this talented Iowa poet, a member of the Iowa Poetry Association and the American Poetry League. Nature poems dominate the collection.

Make Your Own! Full color scaled reproductions of *The Birds Of America*
Kit contains pre-carved body, oil colors, varnish, eyes, legs, mounting block, sandpaper. Complete instructions assure successful model. Choice of: Mallard Duck, Herring Gull, Canvasback Duck, Scarlet Tanager, Goldfinch. We pay postage.
Single kit $1.25 ppd.
5 kits $5.00 ppd.
Bucks Crafters, Dept. N
Newtown Bucks County, Pa

NU-HEALTH THROUGH NATURE'S NATURAL NUTRIENT FACTOR. VITAMINS alone often are not sufficient. Learn about Science's Newest Discovery which unlocks the secret to Good Health necessary for the HEALTHY as well as for the run-down, ailing, nervous person. Write us today, enclosing self-addressed stamped envelope for FREE literature and advice on this subject. Address:
NU-HEALTH LABORATORIES, Dept. D2
LYNBROOK, N. Y.

Free Catalog
Just off the press. Fully illustrated, 100 pages, showing special fishing tackle, footwear, clothing and one hundred and twenty other leather and canvas specialties of our own manufacture.
L. L. Bean, Inc.
34 Main St.
Freeport Maine
Mfrs. Fishing and Camping Specialties

GROW **ORCHIDS** AT HOME — BIG PROFITS SPARE OR FULL TIME
1 YEAR ROUND ANY CLIMATE NO EQUIPMENT
World's most thrilling hobby – profitable home business. Single Orchid plant may multiply into many – each as valuable as the first. **Successful home grower shows you how!** Raise gorgeous Cattleyas, Cymbidiums, Epidendrums, on living-room table. Big-profit orders come from friends, neighbors, florists, etc. – **also Mail Orders.** Illustrated secrets of the experts in simple "show-how" language **AND blooming-size Orchid plants sent at NO RISK. Everything you need to start – for pleasure or profit. FREE** – full details – **SEND NO MONEY.** Write today. **TROPICAL FLOWERLAND,** Dept **282,** 4622 Wilshire, Los Angeles 5, Calif.

USEFUL OPTICAL BARGAINS for NATURE LOVERS

IMPORTED STEREO MICROSCOPES

$160 Value, Only $85 Postpaid. Wide, 3-Dimensional Field. Excellent Depth for Working Under Magnification! Fixed 3-power objective, with 3 pairs of matched eyepieces to give you powers of 15X, 30X, 45X. Rack and pinion focusing. Interpupillary adjustment. Removable from base for mounting on equipment or bench. Fine hardwood case incl. Guaranteed!
Order Stock No. 70,011-AL **$85**—ppd.

ASTRONOMICAL TELESCOPE KITS

Build Instrument worth up to $600. Grind your own mirror. Kits include Pyrex mirror blank, tool, abrasives, pitch, polished 1" Eyepiece, lenses and aluminized diagonal. Order by Mirror Dia.

Stock No.	Size	Pstpd. Price
70,003-AL	4¼"	$ 7.00
70,004-AL	6"	11.00
70,005-AL	8"	18.00
70,006-AL	10"	28.00
70,007-AL	12½"	49.00

NEW 30 POWER TELESCOPE

COMPLETE WITH TRIPOD
Unusual Bargain Price

A beautifully made, sturdy, imported instrument with dozens of uses. Spots 22 caliber bullet holes at 200 yds. All metal body—focuses from approx. 40 ft. to infinity. Achromatic objective—40 mm. dia.—outside surface low reflection coated. Smooth slide focusing eyepiece. Eye-lens outside surface coated. Lens erecting system. Images right side up. Sturdy tripod 8¼" high. Can be used also for camera. Max. length 26¾". Barrel dia. approx. 1¾". Weight 1½ lbs.
Stock No. 70,018-AL ..... **Only $21.94 Postpaid**

IMPORTED BABY MICROSCOPE

80 Power—Only 5" High

A little gem, gives astoundingly sharp definition! Good optical qualities, hinged base for inclined easy viewing, easy-to-use pinion focusing. Circ. stage, revolving disc-light mirror.
Stock No. 50,000-AL ..... **$4.00 Postpaid**

New 2 in 1 Combination Pocket-Size

50 POWER MICROSCOPE and 10 POWER TELESCOPE

ONLY
$4.50
Postpaid

Useful Telescope and Microscope combined in one amazing, precision instrument. Imported! No larger than a fountain pen. Telescope is 10 Power. Microscope magnifies 50 Times. Sharp focus at any range. Handy for sports, looking at rare objects, just plain snooping.
Stock No. 30,059-AL $4.50 ppd.
Send Check or M.O.
Satisfaction Guaranteed!

Imported from England!
Amazingly Practical
TELESPECTS
FOR CLEAR, COMFORTABLE, CLOSE-UP VIEWING
Only $2.00 Postpaid

Worn like sun glasses. Just the thing for nature study—watching birds, animals . . . for seashore, mountains. And what a help at spectator sports. Lightweight plastic in beautiful black finish. Each side focuses individually. Approx. 2½ power. Order—
Stock No. 1528-AL ..... **$2.00 Postpaid**

A HANDY, USEFUL BARGAIN!
HAND SIGHTING LEVEL

Accurately designed and calibrated. Indispensable as a hand sighting tool that projects a level line of sight. Can be adapted for photographic work. Also invaluable for laying out drains, ditches, foundations, gardens; for contour plowing and soil erosion work; whenever grades must be established or a level line is necessary over an appreciable distance. Easily carried in pocket—simple to use! Illustrated directions with each instrument.
Stock No. 105-AL ..... **$2.50 Postpaid**

IMPORTED MICROSCOPE

100, 200, 300 Power
ONLY $14.95 POSTPAID
1 OCULAR
3 OBJECTIVE LENSES
RACK & PINION FOCUSING

Good optical qualities. Fine focusing. Definition is surprisingly clear and good—amazingly so at this price. Revolving disc-light adjustable mirror. Square stage 2¾" x 2¾". Truly a wonderful bargain. TRY IT FOR 10 DAYS—if not completely satisfied, your money refunded. Comes packed in sturdy, hard wood case, accessory eyepieces and objective available.
Stock No. 70,009-AL ..... **$14.95 Postpaid**

LONG WORKING DISTANCE ATTACHMENT for HIGH-POWER MICROSCOPE OBJECTIVES
A New English Development! Gives you extra working space under Magnification plus upright image. Makes dissection easier. These 20X and 40X Objectives have numerical apertures of 0.574. The working distances have been increased to 12.8 millimeters. Made with standard threads. Height 1-23/32", diameter 1¾".
Stock No. 50,013-AL ..... **8 mm.** ..... **$112.00 Pstpd.**
Stock No. 50,033-AL ..... **4 mm.** ..... **$114.00 Pstpd.**
Order by Stock No. Send check or M.O.
Money back guarantee.

GET OUR BIG FREE CATALOG #AL

We have the world's largest variety of Optical items. Bargains galore . . . War Surplus — Imported — Domestic! Our stock includes Microscopes, Telescopes, Hand Spestroscopes, Prisms, Lenses, Recticles, Mirrors and dozens of other hard-to-get Optical items.

Ask for
FREE CATALOG #AL

Order by Stock No. *Send Check or M.O.* *Satisfaction Guaranteed*

EDMUND SCIENTIFIC CORP. - - - BARRINGTON, NEW JERSEY

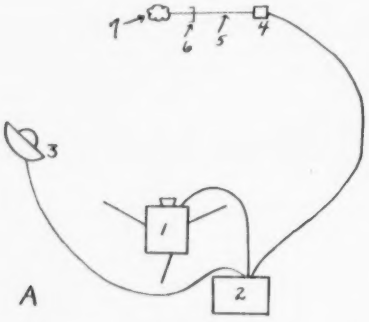
Camera Trails

By
EDNA HOFFMAN EVANS

THE "Camera Trails" sections devoted to remote control photography last October and November seem to have inspired a gratifying amount of reader interest, judging from the letters I have received. It is a subject that has always fascinated me, and I am glad to know that others are also interested.

There is always something new to be learned about photography; by experiment, from books, and from the other fellow. It is on this latter source that I am going to draw this time by quoting at length from two interesting and informative letters from readers in widely separated parts of the country. Incidentally, since these two are not the only letters I have received, by any means, I hope to be able to pass along more of the other fellow's know-how from time to time.

The first letter came from Joseph G. Hall, a graduate student at the University



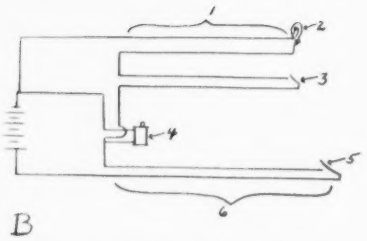
This is a pictorial diagram of the complete flash-trap set-up used by Joseph G. Hall. The various parts are: 1. camera on tripod; 2. battery box; 3. flash bulb; 4. mercury switch; 5. thread between bait and switch; 6. staple to hold thread in place; 7. bait.

of California at Berkeley, where he is working on a research problem in beaver ecology at the Museum of Vertebrate Zoology.

Mr. Hall wrote: "For several years I have been interested in wildlife photography, particularly that in which flash-traps are used in obtaining self-portraits of animals . . . You might be interested in the outfit I have slapped together for the purpose of setting out flash traps with a between-the-lens shutter which operates very well with a solenoid.

"A is a pictorial diagram, B a circuit diagram, and C a detailed diagram of the operation of the mercury switch.

"Regarding C, when an animal pulls the thread this pulls out the trigger prop,



This is a circuit diagram. Parts are: 1. ten feet of wire; 2. flash bulb; 3. built-in synchronizer in shutter; 4. solenoid operating camera shutter; 5. mercury switch; 6. thirty feet of wire.

permitting the spring to pull down the end of the mercury switch which rotates counterclockwise about the screw. During this rotation the pool of mercury falls over into the left hand 'well,' closing the circuit outlined in B. But this is only momentary; as it continues in its rotation under the pressure from the spring, it goes so far that almost all the mercury falls out of the right hand well, leaving a gap between the two contacts so that the circuit is then left open again. It is an 'open, close, open' switch. If it stayed closed when the animal came by, current would continue to run through the solenoid part of the circuit all night long and thus run down the batteries.

"There are many types of open, close, open, or momentary switches which have been tried with equal or better success . . . but this is the one that I have found most satisfactory. I get a big kick out of trying various sets and arrangements of the apparatus and would be pleased to have you offer any suggestions along this line. This, to me, is one of the most fascinating phases of photography and one that too few people indulge in."

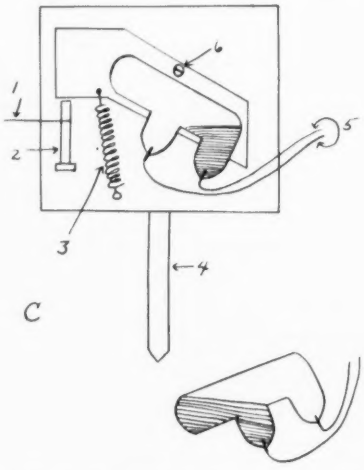
Mr. Hall also outlined and diagramed a method whereby he thought the Exakta camera could be used for remote control photography—a means of touching off the "push-in" shutter release. I will include this in a future section for the benefit of other Exakta users (like myself) who might be glad to get the information.

From a reader living in Port Huron, Michigan, came the suggestion that a braided silk fishline is superior to ordinary store string for tripping the shutter since the silk line does not stretch as badly under increasing tension.

The reader continued: "I have long considered that another promising means of control would be a small electric solenoid, powered by a 6-volt 'Hot Shot' dry battery and connected through a flat pair of No. 18 lamp cords. The battery and push button would be kept in the blind with the photographer, and the only exposed equipment would be the camera and the connecting cord. One obvious disadvantage to this proposal would be the weight and bulk of the battery and cord. To prevent kinking and tangling, the cord would necessarily have to be kept wound on a reel of some sort and, to be practical, there would have to be at least 50 feet of the wire. A battery and a 50-foot reel of wire would be an unwelcome addition to the impedimenta to be transported to the desired location—usually in brush, or weeds, or maybe in a swamp. This weight and bulk argument has kept me from any actual field tests of the idea.

"Another idea of apparent merit came to my attention some years ago when the prevailing shutter release mechanism was the pneumatic type—a rubber bulb was squeezed to produce air pressure and a small tube led the pressure to a little cylinder in the shutter housing . . . . The only limitation on the length of the connecting tube was the size of the bulb required to produce enough pressure to fill the entire length of the tube and have enough 'push' left over to actuate the piston.

"In this case the photographer earnestly



This is a detailed diagram of the operation of the mercury switch. Numbered diagram shows the switch in "set" position. Parts are: 1. thread to bait or across trail; 2. trigger; 3. spring; 4. stake by means of which device is set in the ground; 5. wires; 6. screw around which the mercury switch rotates. The lower figure shows the mercury switch in "fired" position.

desired a record of the domestic activities around a muskrat house. He obtained 50 feet of ⅛ inch rubber tubing (of a brownish-red color), erected a blind at a discreet distance from the house, set up his tripod and camera to cover the best distance from the house, then unwound his tubing and led it back to the blind. There he settled himself in soggy concealment, resolved to argue silently with the mosquitoes until his proposed subjects emerged into the field of view. Time passed—as time will—and presently a great blue heron came slowly stalking along the edge of the marsh in search of frogs, crayfish, and other prey. He passed between the camera and the blind, spotted the rubber tube, and evidently mistook it for either a king-sized angle worm or a skinny elongated snake (either

of which classified in his book as an edible item) and started to treat it appropriately. From a strictly photographic standpoint, the afternoon was a total loss.

"In view of the many failures and apparently insurmountable limitations of the remote control schemes, I have become convinced that the best solution of the problem lies in a long-focus lens. Keep the photographer, camera, and tripod all together in the blind, with all the controls at the fingertips, and let the lens do the stretching for you. Such lenses are available at a price (but SUCH a price) . . .

"You comment that the only way you would consider taking a picture of a bear would be by remote control—the remoter the better. I feel that you really malign the character of a normally good natured and easy going resident of the wilderness. He is shy and retiring and would much prefer to be allowed to go his own way in peace and quiet. If at all possible, he will depart rapidly and without violence when you approach—but his temper is short if frustrated, and I would NOT counsel getting between him and his chosen exit.

"I spent one vacation in good bear country, near Keweenaw Point, and my chief complaint about Bruin was his strong nocturnal instinct. He confines his activities mostly to the hours of darkness or deep twilight. Only once did I accidentally blunder into his presence in broad daylight—I was out a bit early that morning and, apparently, he was going home a bit later than usual. We met at a twist in the trail. The distance was about 50 feet and the light was good. But, unfortunately, he detected me a split second before I saw him, and my camera was hanging over my shoulder on its strap. Before I could get set for a shot, my 'subject' was only a crashing noise in the underbrush. My! What acceleration! He surely must have been using ethyl.

"My own pet problem, still unsolved," our informant concluded, "is how to silence (or at least muffle) the buzz of my Cine Kodak, and the click that always occurs when the motor stops. Have any of your readers encountered difficulties from this source, and what remedies do they suggest?"

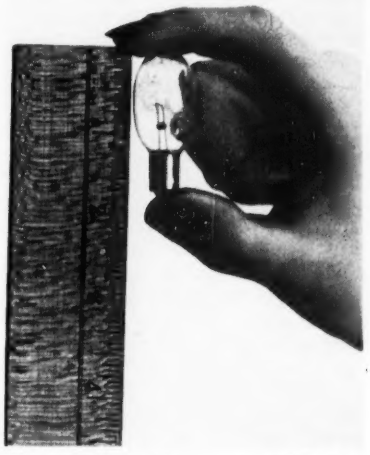
Thus, it would seem, many photographers are interested in the problems and possibilities of remote control photography. Like Mr. Hall, they would enjoy swapping ideas for setting up and arranging equipment. Like our friend, they have had many interesting experiences, and have a few problems yet to be solved. If other readers are similarly inclined, "Camera Trails" will be more than happy to pass these ideas and questions along.

NEW WRINKLES

SINCE the weight and bulk added by extra camera equipment has long been one of my chief gripes, I am more than glad to make note of the following item. General Electric has announced what it calls "the world's smallest, least expensive, most convenient, and most reliable flashbulb yet." This is the M-2, which is similar in size to a small Christmas tree bulb.

The M-2, according to the manufacturer, will produce sufficient light for the great majority of amateur flash needs—that is, enough for good black-and-white picture results at distances up to 15 feet when used with existing reflectors, fast film, and box-type cameras. Owners of better cameras will obtain good results at considerably greater distances. The M-2 retails at 10 cents a bulb, and it takes up considerably less space than the older No. 5 flashbulb. Smaller flash units, adapters, and reflectors are expected shortly to accommodate the small-sized bulbs.

For those who like to keep their snapshots in albums, the Eastman Company is introducing a new line of Kodak Duplex Protecto albums. These albums, which are available with brown or green simulated leather covers, come in two sizes—one for prints 3½ x 5 inches or smaller, and the other for prints 3½ x 3½ inches or smaller. Each album has a capacity of 96 prints in 48 transparent Kodapak sleeves, and these sleeves are bound in loose leaf plastic binders for easy viewing. Albums for the larger sized prints are priced at $7.95 and those for the smaller prints are $6.95 each.



General Electric's new small flashbulb M-2.

Eastman also has announced a revised dial-type Dataguide that is designed to take the guesswork out of enlarging, to quote from the announcement sheet. The Enlarging Dataguide is intended to help compute new exposure times for any change in magnification or lens aperture during the enlarging process. It also makes allowance for the change in effective speed of papers at long exposure times.

Along with the guide, which is about 6 by 8½ inches and is punched for insertion in the Kokak Photographic Notebook, Eastman also supplies a similarly punched sheet which provides data on how to use the Dataguide. Available through Kodak dealers, the Dataguide sells for 75 cents.

TESTA MICROSCOPES

A DISTINGUISHED LINE OF LOW COST MICROSCOPES
LABORATORY SIZE, WITH LARGE, PROFESSIONAL INCLINING STANDS, PRECISE INTERCHANGEABLE OPTICS
SIMPLE TO OPERATE AND MAINTAIN. INSTRUCTION MANUAL FURNISHED
AMERICAN MADE
PROMPT DELIVERIES

MODEL F — 100 to 700X **$92.50**
Parfocal triple nosepiece. Condenser stage with aris diaphragm. Coarse and fine adjustment.

MODEL H — 50 to 700X **$82.50**
Parfocal double nosepiece. Low and high power objective. Coarse and fine adjustment.

MODEL G-3 — 100 to 400X **$59.00**
Triple divisible objective. Substage diaphragm turret. Most economical high school microscope.

MODEL S-2 — 75 to 250X **$33.50**
Double divisible objective. Simple and efficient for elementary science use.

SUBSTAGE LAMPS and other ACCESSORIES

Write for literature to Dept. NM

TESTA MFG. CO.

418 S. Pecan St., Los Angeles 33, Calif.

SEE MORE ON ALL YOUR TRIPS!

SAVE!
SAVE!
SAVE!
World's Greatest
BINOCULAR VALUES!
WRITE FOR NEW FREE CATALOG!
33 Models
$17.95 UP
30 Day FREE Trial
Guaranteed to give you more and save you money on every popular model. Don't overpay! Compare BUSHNELL'S before you buy. Send for FREE CATALOG and
Dealers Invited
FREE Book "How To Select Binoculars"
BUSHNELL Binoculars
Dept. NB3 Bushnell Bldg. Pasadena 1, Calif.

Free Book on Arthritis And Rheumatism

HOW TO AVOID CRIPPLING DEFORMITIES

An amazing newly enlarged 44-page book entitled "Rheumatism" will be sent free to anyone who will write for it.

It reveals why drugs and medicines give only temporary relief and fail to remove the causes of the trouble; explains a specialized non-surgical, non-medical treatment which has proven successful for the past 35 years.

You incur no obligation in sending for this instructive book. It may be the means of saving you years of untold misery. Write today to The Ball Clinic, Dept. 543, Excelsior Springs, Missouri.

Nature Workshop
at the Morton Arboretum
field work, lectures, discussion, devices, games, songs, crafts
2 One-week Sessions
June 13-19, 20-26
Write for program, to
The Morton Arboretum, Lisle, Ill.

SPENCER FULLERTON BAIRD

(Continued from page 148)

550 pages in extent and were well illustrated by plates and woodcuts (in part by Ridgway), some of which were colored in one edition. From the nature of things this "History" could not be as revolutionary for ornithology as that of 1858, but it surpassed any previous work in quantity of information on life-histories of birds, contained an improved classification of the hawks and owls, and introduced many new varieties. An essay on the class of birds was contributed by Theodore Nicholas Gill, and a key to orders and families, as well as a glossary, by Elliott Coues.

The years involved in the preparation and publication of these ornithological works found Baird's time increasingly taken up by the duties of his Smithsonian post and by new obligations. In 1871 the United States Fish Commission was created by Congress and Baird was appointed Commissioner—a position that added vastly to his duties but not at all to his emolument. It meant more and more work, certainly until an Assistant Commissioner was provided in 1880. Congress at length recognized the value of this volunteer service by appropriating a substantial sum to Baird's widow and daughter.

To apply the language of today, Baird, despite his overload of work, acted as his own publicity agent, announcing discoveries by Smithsonian men, explaining the fisheries program to the public, and, in general, reporting scientific findings in the language of the people. Upon request, he wrote half a column weekly for the *Philadelphia Ledger*, contributed to, and edited, a natural history department for *Harper's Magazine*, and prepared a scientific column for the *New York Times*. These writings were assembled, modified, and supplemented in volumes entitled, *The Annual Record of Science and Industry*, 1871-1878. In the last of these years, he was made Secretary of the Smithsonian Institution and no longer thought it desirable to continue such journalism. The wonder is how he ever found time for it. That his journalistic labors were inspired by a desire to be helpful, and not for self-advertisement, is indicated by his attitude toward societies. One of the several distinguished biographers with whom he has been blest, states that Baird "was ready to do anything for Societies except to attend, to talk, or to fill any official position in them." Thus he was no seeker of the limelight.

The Centennial Exposition at Philadelphia in 1876 was a great event, with far-reaching consequences. Under Baird's direction was prepared an exhibit from the National Museum that was thought by many to be the finest of all. Baird spent most of the open period at the Exposition and succeeded in pledging the donation of an enormous number of exhibits to the Museum. These were of great permanent value, but brought up urgently the need of adequate space and housing. The government loan to the Exposition being repaid, the time was propitious for asking Congress to appropriate for a National Museum building. That was done in 1879 and the structure was completed in 1881.

Making dreams come true was the fruit of Baird's energy, industry, tact, and integrity. A Senator said of him: "I am willing to give the money asked by Professor Baird for he will get two dollars worth for every dollar we give him, one-half by direct purchase and one-half by gift." An eminent biographer, Surgeon General Billings, wrote of him: "He let his assistants work in their own way, ready to help or advise when called on, but never fussily interfering, or dictating minutiae of methods." He won their loyalty and affection, sincere expression of which may be quoted from Robert Ridgway, the Illinois boy he helped to greatness. "In all his relations with Professor Baird," said Ridgway, "the writer remembers with deepest gratitude and reverence, his uniform great kindness of heart, his genial manners, his wise counsels, and his steadfast friendship; and, with others who were so fortunate as to have enjoyed the privilege of his acquaintance, he mourns a departed friend and teacher, whose loss is irreparable."

The fisheries work allotted to Baird before he became Secretary of the Smithsonian Institution (the respective dates, 1871 and 1878), although a burden, continued an almost lifelong interest, and he became so absorbed in it that during the last four or five years of his life, he thought of little else. So when recurring heart attacks presaged the end, he went to Wood Hole and his beloved Marine Biological Laboratory, to await it. Three days before his death (on August 9, 1888) he was taken about the place in a wheelchair and, although he knew it was for the last time, he had a word of good cheer for everyone.

Some of the honors that came to Baird early, when they were most appreciated, have been recounted. In later life others poured upon him, embracing all that might be expected for a man of his positions and achievements. These will not be listed but it does seem desirable to mention those, in part posthumous, that would be most gratifying to a lifelong naturalist—the naming for him of a glacier in Alaska, and of numerous organisms of various classes, including eight North American birds.

JEFF'S WILD GUESTS

(Continued from page 152)

in the cabin. But the fourth day was a scorcher, so we decided to cook and eat under the redwoods. I was sweating over the barbecue trying to get the fire just right when Jeff approached from the front of the cabin, announcing in a rather restrained voice that he had caught a rattlesnake. I naturally assumed he meant he had killed it, until I turned my head and saw him holding at arm's length a four-foot, writhing and twisting, timber rattler. Of course, he was holding it so it would not bite him, but I suggested he had better kill it before it did have a chance to bite someone. He begged to be allowed to take it home for a pet, but I countered with the suggestion he ask his mother about that. So he headed for the kitchen where my wife was making a salad.

I was close enough to the kitchen door to hear and see what took place. She was at the kitchen sink working on the salad when Jeff entered. I heard him announce his capture of the rattler and her reaction was similar to mine, while her back was still turned. He asked if he might take it home and she wanted to know what he wanted with a dead snake at home. He only got as far as saying, "It isn't dead . . .", when she whirled around and found herself face-to-face with a writhing, ten-button rattler. This was too much. "Take that thing out of here! Take it out, do you hear me!" she shouted. "Are you crazy? Do you want to get killed? Take that out this instant and have your father kill it! This very instant!" "But, mother, it can't bite anyone the way I'm holding it. Look at its long fangs. . ." It was a tossed salad alright; she tossed it at Jeff as he ran through the door.

We have had so many creatures that it is difficult to remember them all. There was a baby robin that fell out of its nest and was almost pecked to death by its mother; a sparrow with a broken wing taken forcibly from the jaws of a cat; two of the cutest baby barn owls, one of which lived only a month but was so sweet natured we grew to love it dearly, and one that was as mean as sin, but tolerated Jeff because it knew from whence came its horsemeat and field mice. One evening the owl gave Jeff quite a gouge with its talons so that he let go of it, and away it flew, never to return.

Someday I might even try to write a book, "Wild Animals I Have Met Socially," with an introduction by my son. All these experiences have convinced me that no animal is born with a hate for man. Even if they have developed a fear and distrust, it can usually be turned into affection, or at least respect, when people like my son Jeff show such a heartfelt interest in their wellbeing.

Butterflies and Moths

Collecting Butterflies and Moths. By Ian Harman. New York. 1954. John de Graff, Inc. 128 pages. $1.95.

This book was originally published in Great Britain and has reference to species of butterflies and moths found there. However, the details of collecting are applicable anywhere.

Flower Coasters and Tiles

PRESERVE *Real* FLOWERS in *NEW* CRYSTAL PLASTIC

"Pours like water . . . Sets like glass"

NEW BOOK Shows How:

• to permanently preserve real flowers, photos, coins, shells, star fish, butterflies, etc., in Castolite • Create exquisite jewelry • Cast beautiful figurines, plaques, candlesticks, other lovely things for gifts or to sell. Comes crystal clear or may be dyed for brilliant color effects. Can be sawed, drilled, carved.

YOU CAN DO IT—AT HOME WITHOUT EXPERIENCE. Illustrated step-by-step instructions show how to get started, what to make, to have fun, make money. Free with book, new manual *"How to Make Jewelry"* and proven *"Home Success Plan."* Send 25c to **CASTOLITE, Dept. B-29 Woodstock, Ill.**

25¢

HELP

for

CRIPPLED CHILDREN

and

ADULTS

Natl. Soc. for Crippled Children & Adults, Inc. 11 S. LaSalle St., Chgo. 3, Ill.

MARCH 18 ★ APRIL 18

Wild Flowers

The Macmillan Wild Flower Book. Text by Clarence J. Hylander; illustrations by Edith Farrington Johnston. New York. 1954. The Macmillan Company. 480 pages. 232 plates in color. $15.00.

This beautiful book is, of course, notable for its lovely color plates but the brief popular text is important, too, when the book is used for identification. It is not, of course, a handbook for field use, being in large size, but a volume with the aid of which specimens may be identified at home. It is, as well, a book just for the looking and admiring.

Aquarium Fishes

Keeping and Breeding Aquarium Fishes. By C. W. Emmens. New York. 1953. Academic Press, Inc. 202 pages. Illustrated. $4.50.

While there are, of course, no few books on aquaria and their inhabitants, many of these are to be obtained only in a library. So there is real need for a practical and modern handbook. This is one that is useful both to the expert and to the beginner. Information is supplied on setting up and maintaining aquaria; breeding; anatomy and physiology of fishes; discussion of fish diseases including their treatment with antibiotics. There is also material on marine aquaria.

Tree Check List

Check List of Native and Naturalized Trees of the United States. By Elbert L. Little, Jr., Washington 25, D.C. 1953. Superintendent of Documents, U.S. Government Printing Office. 472 pages. $2.00.

This is Agriculture Handbook No. 41 and was prepared under The Forest Service Tree and Range Plant Name Committee. It is a compilation of the accepted scientific names and current synonyms, approved common names and others in use, and ranges of the native and naturalized trees of the United States, including Alaska. It is primarily a reference work for foresters, botanists, students and all others interested in trees. It is the official standard for tree names in the United States Forest Service.

Weather

All About the Weather. By Ivan Ray Tannehill. New York. 1953. Random House. 148 pages. Illustrated by Rene Martin. $1.95.

This is one of the "Allabout Books" being brought out by this publisher for the younger reader in approximately the 9 to 12-year bracket. The author is Senior Meteorologist of the United States Weather Bureau. He dedicates this book to his three grandchildren—Ric, John and Jane—to whom, we have no doubt, he has explained the weather, and from the telling found how to write this book, which is a splendid introduction to meteorology.

Cattleya Mossiae (The Easter Orchid)
Full-size, corsage-type flowers.

"The" *EASTER* Plant

Orchids thrive in the window of any room with actually less care than other house plants. Inexpensive and different, orchid plants are perfect gifts for any plant lover. Everlasting, with no special equipment needed.

SPECIAL for Easter

Shipped anywhere in bud to bloom for Easter

5 INCH POTS	6 INCH POTS	7 INCH POTS
$6.00-$10.00	$7.50-$12.50	$10.00-$15.00

f.o.b. South San Francisco

Rod McLellan Co.
1450 T El Camino Real
South San Francisco, California

ATTRACTS WILD BIRD TO YOUR GARDEN WITH OUR PATENTED AUTOMATIC FEEDERS

SQUIRREL'S DEFEAT $8.00 POSTPAID
Write for free folder on various other feeders

audubon workshop

DEPT. A.N.
INCORPORATED
Box 67 Wonder Lake, Illinois

Learn to **MOUNT BIRDS and Animals**

LEARN BY MAIL
At Home, in Spare Time
HUNTERS, SPORTSMEN, save your **TROPHIES.** Be a taxidermist. Mount ducks, deer, pets. Tan skins. **FREE BOOK** tells you **HOW** to LEARN this dandy art. 100 FREE game pictures. Grand and wonderful. Quickly learned by **men** or **boys.** FUN AND PROFIT. Send for FREE BOOK. State **AGE.**

N. W. SCHOOL OF TAXIDERMY, Dept. 8103, Omaha, Nebr.

LIFE'S SPARK IN A PINE SEED

(Continued from page 153)

up. Dogs and snow plows took their toll during the year that followed. Now one lone seedling remains to prove the will to live that lies in a dormant seed.

The progress of the little Westerner, which more or less rose from the dead, was watched with considerable interest and the question arose as to its proper name. When John Riley of the Oregon State Department of Conservation was in the neighborhood on a visit, he was asked to try to identify the baby pine, and the cone was shown him for this purpose.

From his vast fund of knowledge of the West's great outdoors, John Riley said that the cone once adorned a digger pine, *Pinus sabiniana*. The large seeds were a major food item of a minor Indian tribe known as the Digger Indians, and that is how the tree got its name. It is one of the so-called pinon pines. The forester gives the digger pine scant attention, for its wood has no commercial value. But up in a tiny New England village, one digger pine, which will be all of eight inches high at the end of its fourth growing season, is tended carefully, and watched with considerable interest as it starts out on what is hoped will be a long life.

JUPITER AND HIS FAMILY

(Continued from page 157)

members of this group, is only about 15 miles in diameter. It was discovered in 1938 at Mt. Wilson by Dr. Seth B. Nicholson, who has discovered four of the small satellites of Jupiter. It is so tiny that it has never been seen visually with any telescope but has been discovered, and since observed, only photographically.

In the third and outermost group of satellites of Jupiter, at mean distances of about 14,000,000 miles, are four satellites two of which, VIII and IX, were discovered accidently while photographing other satellites of Jupiter. The first named was found by Melotte in 1908 at the Greenwich Observatory, and the second by Nicholson at Lick in 1914 while photographing Satellite VIII. Their diameters, estimated from their brightness, are about 35 and 17 miles respectively. Satellites XI and XII were both discovered by Nicholson, in 1938 and 1951. The first named is about 20 miles in diameter, and the last, only 14 miles in diameter, is the smallest of all the satellites of Jupiter. Satellite X and XII have been detected on the photographic plate but never seen *visually* with a telescope.

All of the four outermost satellites of Jupiter have orbits that are very elliptical in shape, and although the *mean* distance from Jupiter may be around 14,000,000 miles for Satellites VIII and IX the actual distance may range from about 9 million to 20 million miles. Their motion around the planet is unstable, and the hold that Jupiter exerts over them is weak. The gravitational pull, under certain conditions, that the *sun* exerts upon them may be so great as to take them away from the planet and make them direct satellites of the sun. Again, small satellites of the sun, asteroids or other meteoric masses, might be permanently captured by Jupiter under certain circumstances. All four of the outermost satellites retrograde, or back around the planet in clockwise direction, opposite to the usual west to east, or counterclockwise, direction of most members of the solar system. At a distance so great from the controlling body retrograde motion for a satellite appears to be more stable than direct motion.

Mercury will be in inferior conjunction on March 1 and at greatest western elongation on March 28. This is an unfavorable elongation and the planet will be too low in the east before sunrise for easy observation around that time. Venus is now an evening star, but low in the west at sunset. Mars is improving its position. It rises around midnight in Scorpio and is now brighter than Antares, steadily increasing in brightness. Jupiter is now near the meridian at sunset, in Taurus, and sets around midnight. Saturn is in Libra and rises about two hours before midnight and is above the horizon for the remainder of the night. Spring will commence this year on March 20, at 10:54 P.M., E.S.T., when the sun crosses the equator coming north.

Contest for Teachers

"Why I Teach" is the title of essays sought in a contest sponsored by the American Legion Auxiliary. It is designed to encourage good teachers to remain in the teaching profession and eligible young people to enter the profession. Contestants must have completed five years of teaching by June 1, 1954. The form of the essay must be an open letter to a high school graduate containing not more than 300 and not less than 100 words. The deadline for entries is May 1, 1954. There will be a national award and five divisional awards. Headquarters of the Auxiliary are at 49 West 44th Street, New York 36, N. Y.

Muskox Increase

In 1936 a herd of 31 muskox was placed on the Nunivak Island National Wildlife Refuge in Alaska. The 1953 count of these animals, which have a low breeding capacity, showed a herd of 90. These muskox resemble small buffalos and are related to cattle. They were once common in Alaska, but were killed indiscriminately by explorers, traders and natives. An attempt to domesticate the muskox was made at the College Experimental Farm at Fairbanks, but this proved unsuccessful, so they were placed on the Refuge.

Bergen Swamp

Report from the Bergen Swamp Preservation Society records slow but sure, we trust, progress towards its goal. Six hundred and seventy acres of the two thousand sought in order to preserve this outstanding tract in Genesee County, New York, have been acquired. The Society now has 278 members. An attractive leaflet describes this natural treasure, and D. Walter C. Muenscher of Cornell has complied a check list of the more common plants found in the swamp. For information about the fine program of this Society, write to Mary M. Silfer, 150 Cobb Terrace, Rochester 20, New York.

Illustrated, but Unknown

Alexander Wilson and John James Audubon each described and figured two supposed species of birds, which present-day ornithologists have been unable to identify. These may have been hybrids, mutants, or even figments drawn from memory rather than from specimens. Audubon backed up Wilson's postulates and made two of his own.

An interesting sequel was that although later authors were dealing with unknowns, this did not keep them from revising the names to suit their tastes. Wilson's small-headed flycatcher, recorded by him from New Jersey and by Audubon from Kentucky, was later dubbed minute flycatcher, small-headed sylvan flycatcher, and small-headed warbler. This form, as well as his Blue Mountain warbler from Virginia, were also given French names that are not here cited.

Cuvier's *Regulus* reported by Audubon from Fatland Ford, near Norristown, Pennsylvania, has been renamed Cuvier's golden-crest, Cuvier's crested wren, Cuvier's golden-crested wren, Cuvier's kinglet, Cuvier's wren, and black-banded ruby-crowned wren, besides a single appellation each in French and German. And his carbonated warbler from near Henderson, Kentucky, has been called carbonated swamp-warbler and dusky warbler.

This doing over of other men's work, even in the hypothetical field, seems to indicate an over-powering editorial instinct.—W.L.M.

Curious Creatures

Curious Creatures. By Erna Pinner. New York. 1953. The Philosophical Library. 256 pages. Illustrated by the author. $4.75.

A book of British origin, the author finds some of his curious creatures in the United States, where, interesting as they are, they are not so strange. The text is interesting to read and the illustrations excellent.

THE READER'S MARKET

A place where members of the American Nature Association and readers of Nature Magazine may find many interesting offerings or may advertise themselves, at low cost, for things wanted; things they have for Sale, for Trade, for Sale or Trade. This is an excellent forum for acquiring or disposing of such items as binoculars, books, cameras and photographic equipment, magazines, sports and outdoor equipment, etc.

AGENTS WANTED

BUY WHOLESALE—25,000 items—Catalog 25c. Matthews, 1474-Y6 Broadway, New York City 36.

AUTHORS SERVICE

BEGINNING WRITERS: Get $1 to $20 checks daily writing simple children's stories, articles, poetry in your spare time. Experience unnecessary. Our instructions reveal how. Details free. W. Herman, 5927 Euclid, Cleveland 3, Ohio.

BEES

BEES INCREASE SEED and Fruit Yields. Require little attention. Big profits, Stingproof equipment, magazines, books, bee hives. Factory prices save 25%. Free advice from experienced bee men. Free catalog. Walter Kelley Co., Clarkson, Kentucky.

BINOCULARS and FIELD GLASSES

BINOCULARS, Microscopes, Telescopes, amazing prices, free trial. Folder "Binocular Selecting" catalog free. Prentiss Importers, Mercury Bldg., West Los Angeles 25, Calif.

BINOCULARS, TELESCOPES—Optical Goods. Large selection. Sensible prices. Learn truth about binoculars. Coating debunked. Free 38th Anniversary Catalog. DuMaurier Co., 83C, Elmira, N. Y.

BIOLOGICAL SUPPLIES

NATURALIST'S CATALOG 10c. Reptile Bulletin 5c. Salamander 60c. Chameleon 75c. Turtle 85c. Pair Hamsters $2.75. 200 Mealworms $1.20. 300 Insect pins $1.50. Quivira Specialties, Topeka 20, Kansas.

BIRDS

BIRD LIFE in glorious direct color. 2x2 projection slides from exclusive closeup color photographs—used by students, instructors, clubs. Twelve slides, $5.00. Twenty-five, $10.00. John Stemen, Goshen, Indiana.

BOOKS

BOOKS—NATURAL HISTORY our specialty. Also catalogs including Gardening, Americana, Art, Biographies, Literature, and Travel. John Johnson, R.F.D. 2, No. Bennington, Vermont.

BOOKS! Hard-to-find and out-of-print our specialty. All subjects. Send Wants! Jaher Book Service, 620-N. East 178th St., New York 57.

POWERFUL MENTAL TELEPATHY. Unlimited Free Literature. Joseph Johnson, Globe Road, Lewisburg, Tenn.

BOOKS ON BIRDS. Mammals, Reptiles, Trees, general nature subjects. Catalog sent on request. Pierce's, Winthrop, Iowa.

THIRTY YEARS OF experience proved that people know where to go for their out-of-print books. We make no extravagant claims! Dept. N, Audubon Book Service, 415 Lincoln Ave., Brooklyn 8, N. Y.

FOR LITTLE KNOWN facts read the Natural History of the Pig by Ida M. Mellen. Illustrated. Exposition Press, 386 Fourth Avenue, New York. $3.75.

COLOR SLIDES

TWO-INCH COLOR SLIDES. Western scenes and nature subjects. Choose from approval selections at lowest price. Write for information. Nesbit's, 711 Columbia Road, Colorado Springs, Colo.

COUNSELOR WANTED

NATURE COUNSELOR—man or woman to teach "Nature Study" in an exclusive summer camp for girls, experience and enthusiasm essential qualities. Write Burr Oaks Camp, 3177 Broadway, Chicago 14, Illinois.

FRUITS

LIVE LONGER, FEEL better, eating Riolem juiceful, uncolored Oranges, Grapefruit, $2.50 bushel. "Riolemcres", Denver, Florida.

HELP WANTED FEMALE

A DRESS-LINGERIE shop in your home. No investment. Good commissions. Write for Sample Book. Modern Manner, 260EJ Fifth Avenue, New York, N. Y.

HOBBIES

SEASHELLS, Nature's Treasures of the Sea, appeal to Hobbyists. Lists of $1.00 to $5.00 Specials on request; 5 Odd Marine specimens $1.00; write for free lists today. Mrs. F. K. Hadley, 48 Adella Ave., West Newton, Mass.

INDIAN RELICS

SPRING RELIC-AMERICANA Catalog 25c. Superior Axe-celt, Arrowhead and Birdpoint $5.85. Tilton Relics, Topeka 20, Kansas.

6 PERFECT ANCIENT ARROWHEADS $2.00. Grooved Stone Tomahawk $3.00. 6 Tiny Bird Arrowheads $2.00. Ancient Peace Pipe $5.00. List free. Lear's, Glenwood, Arkansas.

INSECTS

JAPANESE INSECTS: Largest collection in Japan; 20 Butterflies $2.50, 30 Butterflies $3.50. Many uncommon species. Hashimoto Biological Laboratory, Haramachi, Shinjukuku, Tokyo, Japan.

LIVING COCOONS

ONE OF THE Nation's largest selections of living cocoons. Price list sent on request. Melville Osborne, 2100 Price St., Rahway, N. J.

MINERALS

FOR ONLY FIVE CENTS, we will send you a sample copy of Gritzner's Geode "The friendly little mineral publication" including our latest price list of quality minerals. Gritzner's—Mesa 7, Arizona.

MISCELLANEOUS

A MINERAL COLLECTOR'S GUIDE TO WYOMING 25c. Gritzner's, Mesa, Arizona.

SEEDS

NATIVE WILDFLOWER SEED. Free list of over 150 species with culture. Many rarities. David Burns, Box 85, Barrington, N.J.

STAMP COLLECTING

50,000 STAMP GRAB BAGS, 25c each. Anderson 630 Bingaman, Reading 11, Penna.

FREE: BIG United States Catalog. Valuable guide and check list. Hundreds of illustrations. Approvals. Harrisco, 182 Transit Building, Boston 17, Mass.

TREES

DWARF REDWOOD TREES discovered—for pots, tubs, planting. Six giant redwoods—twenty baby trees. Best DWARFING handbook. Imported plants, green rose, horsehair tree, wild flowers. Catalog 25c—folder FREE. Join Rare Plant Club, Box 398-NM, Kentfield, California.

TELESCOPES

SKYSCOPE, the full 3½-inch reflector, price — $29.75. Sixty power, ¼ wave aluminized mirror, equatorially mounted, ready for use. Guaranteed observatory clearness. Used by schools, universities. Straightforward descriptive literature on request. The Skyscope Company, Inc., 475N Fifth Avenue, New York 17, N. Y.

SPECIAL BUTTERFLY MOUNTING KIT

offered to the public for the first time at a very special price. You get 10 tropical butterflies, one 4" by 12" spreading board, 50 insect pins, 50 glass-headed pins, 2 glass strips used in mounting, one pair of forceps, relaxing jar for softening dried butterflies, one Riker display mount, paper strips for pinning down wings, and a free instruction leaflet in picture form. All the material you need to start a Butterfly Collection.

ALL THIS FOR ONLY $2.95 plus 25c for postage and insurance

BUTTERFLY NYLON NET—24" handles only $2.00 each

ENTOMOLOGICAL SUPPLIES
Riker Mounts—Insect Pins, etc.
Many Bargains — Price List Free

BUTTERFLY ART JEWELRY INC.
289 E. 98th St., Dept. N, Brooklyn 12, New York

UNDER THE MICROSCOPE

By JULIAN D. CORRINGTON

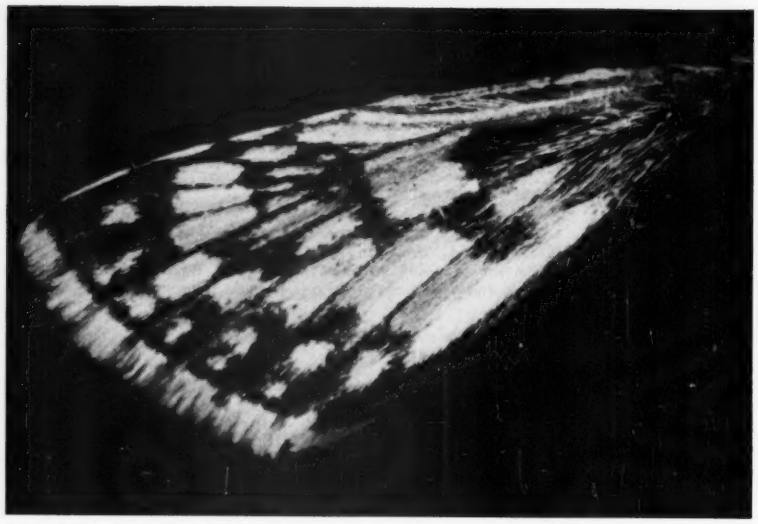
INSECT WINGS

ONE of the most distinctive features of insects is their possession of wings. To be sure, there are numbers of insects that lack these appendages, either primitively, as the silverfish, or secondarily, as lice and fleas and worker ants, whose ancestors once had them; but the vast majority in this class are winged. Inasmuch as wings are among the simplest of all objects to mount on microscope slides, and fall into categories that illustrate classification, adaptation, protective resemblance, evolution, and other biological phenomena, they are an excellent subject for the microscopist to consider for the making of a collection.

True flight, as distinguished from gliding or sailing, has been invented four times in the history of animal life on this planet, each time by a different group of creatures. Three of them were vertebrates; the extinct pterosaurs of the reptile class, birds, and bats of the Class Mammalia. In all of these it was the forelimb that was modified to a wing, differing in design in each of the three. However, with insects, the wing is not a jointed appendage at all and does not represent a leg, or some other structure made over into an organ of flight. Instead, it is an extension or flap of the body wall, that grows out like a shelf, becomes hinged at the base, dries out and, in adult insects, is a dead substance in the same way as is true of our outer fingernails and hair.

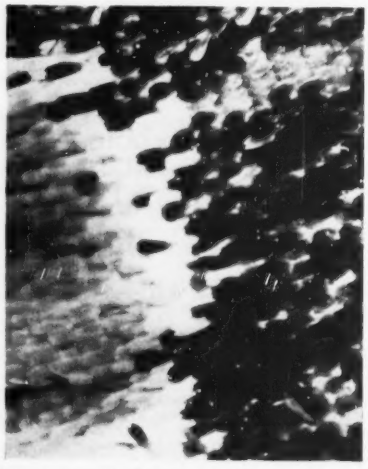
The wings are borne solely on the posterior two of the three divisions of the thorax, and hence are known as the *mesothoracic wings* (forewings, front wings, primary wings) and *metathoracic wings* (hind wings, rear wings, secondary wings). On the evidence of fossil roaches from the Pennsylvanian Period of the late Paleozoic, the prothorax may also have started on the road toward acquiring a pair of wings, as there were pad-like extensions of the body wall of this segment; but these never developed into wings as far as is known. Doubtless three pairs would have proved too many; some insects have gotten rid of the rear pair and find two wings better suited to their way of life—these being certain mayflies (Ephemerida) and the true flies (Diptera).

The typical wing is thin and membraneous, and appears gauzy and delicate, yet is rendered sufficiently strong through reinforcement by hardened lines usually termed "veins." It may be further strengthened or so modified as to resemble its original form but little and become useless in flight. For example, grasshoppers (Orthoptera) have leathery forewings called *tegmina* and beetles (Coleoptera) are characterized by horny front wings that meet in a line down the middle of the back, known as *elytra*, and serving to encase and protect the membraneous hind wings. The elytra are not only useless in flight, they would even appear to interfere; yet some beetles are among the swiftest and strongest of flyers. The true bugs (Heteroptera) have *hemelytra* in which the anterior half is leathery and the posterior half membraneous, borne on the mesothorax. The second pair of wings in flies has become vestigial; they are called *halteres* or *balancers*, are slender, knobbed at the tip, and aid in flight as organs of equilibrium. They may be seen to best advantage in crane flies.



Complete wing of a skipper, the common checker spot, *Hesperia communis*, 12X. Slide loaned by Charles Vanbuskirk.

Mosquito wings (Diptera) are fringed posteriorly with hairs, as is the case also with some moths; while thrips (Thysanoptera) have such long, slender wings so heavily fringed that they seem all hair at first glance. Caddis flies (Trichoptera) have the whole wing clothed with hairs, whereas in the Lepidoptera (butterflies, moths) the entire body, usually including the wings, is provided with a dense covering of hairs and scales, the latter being modified, flattened and sculptured hairs. On the wings, these scales are imbricated to form a shingling, often compared to that of a roof. As these microscopic scales adhere to the fingers when one grasps a butterfly by the wings, and since their ultramicroscopic structure, acting as a diffraction grating, determines the color and pattern of the wings, specimens for insect collections are ruined by handling and must be caught with a net and then pinned and positioned with instruments.

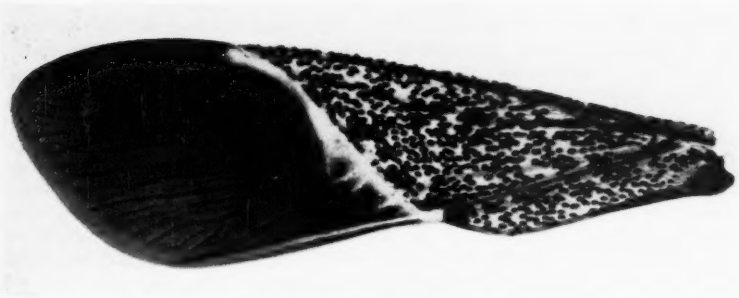


Portion of viceroy wing to show scales, 65X.

Sometimes the two wings of a side are more or less joined together, at the will of their owner, for more effective flight. In the majority of cases the forewings are the larger, and this tendency to increase the flight surface of the front pair at the expense of that of the rear pair reaches its ultimate goal in the Diptera, in which the forewings are large and the hind pair reduced to halteres. Nearest approach to complete union of the two of a side to make a single flying surface is seen in those insects that hook these wings together. As we have described and figured for the honeybee (this Department, Feb., 1953), a series of hooks or *hamuli* along the front margin of the rear wing fit into a trough of the rear margin of the front wing. This device is present in most wasps and bees (Hymenoptera).

In the Lepidoptera, some moths have clear, scaleless areas in one or both pairs of wings, and there may be a series of interlocking spines that couple the two of a side together; some have a *jugum*, a lobe at the base of the rear margin of the forewing, and some have a *frenulum*, an enlarged lobe or tuft of bristles or spine projecting forward from the base of the rear wing, both structures used in coupling the wings.

Certain male butterflies have *androconia* or scent scales on their wings that produce an odor serving to attract females of their



Forewing of the squash bug, *Anasa tristis*, 12X. Example of a hemelytron. Slide courtesy Ward's.

species. Many of the Orthoptera have sound-producing or *stridulating devices* with which, on hot summer nights, they make music, familiar to everyone. These involve specialized, stiffened areas and veins of wings, rubbed together, or played upon by spines of a leg.

Position of the wings and habits of holding them when at rest and of folding into compact dimensions makes an interesting topic in itself. Dragonflies (Odonata) illustrate the primitive type in this respect; the wings are held horizontally, at right angles to the long axis of the body, whether in use or at rest. Their close relatives, the Damselflies, however, fold the wings back along the abdomen, hold them out, or elevate them at rest, according to type. Butterflies press the wings together vertically above the body when they alight, whereas moths hold the wings horizontally, or roof-like over the abdomen, or wrapped around the body, and many skippers carry the forewings vertically and the hind wings horizontally, a characteristic used in field identification.

Those insects having wing covers possess very large hind wings, since these must do all or most of the work in flying. To protect these delicate, membraneous hind wings beneath the wing cases when at rest, they must be folded. Grasshoppers fold them in pleats, like a fan; beetles fold them first transversely, then lengthwise.

A comparison of the flying mechanism of vertebrate and insect is most interesting and instructive. The vertebrate arm has two sorts of muscles on a basis of their attachments. *Extrinsic* appendicular muscles are those, like the huge *pectoralis* of the breast, whose fixed attachment (*origin*) lies completely outside the limb, in this example from sternum and ribs; whose movable attachment (*insertion*) is upon the limb, in this case on the front surface of the humerus or upper arm bone; and contraction of which brings the arm forward across the breast. Such a muscle moves the arm as a whole and is unable to move a portion of the arm separately. *Intrinsic* appendicular muscles lie wholly within the limb; that is, they have both their origin and insertion within the limb, and thus they cannot move the limb as a whole but only a portion, moving one part upon another. Best known of examples is the *biceps*, covering the front of the humerus and serving to flex the forearm. We use the pectoralis in making a forehand tennis stroke, and the biceps in chinning ourself on a trapeze.

Fishes, having fins, possess only extrinsic appendicular muscles. The fins are flexible, but have no joints within them for bending one part upon another. Beginning with salamanders as the first land vertebrates, all terrestrial vertebrate classes have both kinds of muscles operating the arms and legs. Insects have only extrinsic wing muscles; they cannot bend or move part of a wing (save in the passive action of folding) and use it as a planing surface. The muscle fibers are striated—in fact, with the most complex of all known patterns of striation—but are clear, whitish, or yellowish, unlike the red appearance of vertebrate muscle. Insect muscles seem very delicate, but are capable of such rapid alternation of contraction and relaxation that we can only use the term vibration to describe their action. The wing muscles are the *anterior* and *posterior pleural muscles* and these are inserted on tiny bits of the skeleton at the base of the wing. The separate hard parts of the insect exoskeleton, corresponding to bones in a vertebrate, are termed *sclerites*, and those at the wing base are *axillaries*.

The relations of muscle to skeleton are reversed in insects to that with which we are familiar in vertebrates like ourselves. Our locomotor skeleton is internal, with muscles outside the bones; the insect hard parts constitute an exoskeleton, with the sclerites outside and the muscles inside. The skeletal material is also very different; vertebrate bone is mineral, chiefly compounds of calcium and phosphorus, intimately combined with organic products, and is a living and growing (when young) tissue. It must be fed, and thus has a blood and nerve supply. Insect sclerites are condensations of *chitin*, an organic substance secreted by outer cells and exemplified by such familiar items as horn, silk, spongin fibers, feathers, hair, and nails. Beetle elytra are outstanding exhibits of chitin. When formed, this material is dry, dead, and must be shed periodically to permit growth of the animal.

In their embryological development, insect wings start as outpocketings of the

UNITRON

Have you ever seen a *living* cell?

Or are you familiar only with lifeless, stained slides whose static appearance resembles textbook illustrations. With a **UNITRON PHASE MICROSCOPE**, highly transparent material such as living cells, bacteria, organisms, etc. are revealed with startling contrast and clarity. No need for tiresome staining which distorts and kills living specimens.

Phase Microscopy has been hailed as "the most important development in light microscopy since oil-immersion objectives" and earned for its inventor The Nobel Prize in Physics for 1953. **UNITRON PHASE MICROSCOPES** are priced so low that this newest microscope technique is now available to all. The Amateur Scientist and School Laboratory will find these microscopes an amazingly powerful aid in the observation of living protozoa, rotifers, marine plankton, crystal growth, etc. For the Industrial Laboratory, there are a multitude of applications in the study of emulsions, suspensions, colloids, fibres, etc. Write today for informative literature on phase microscopy which describes and illustrates all four **UNITRON** Phase models.

- **Can also be used for ordinary bright field microscopy. Model MPE allows continuous transition from bright field to phase contrast.**
- **Simple to use. No diaphragm adjustments.**
- **Highest resolving power is obtained.**
- **Choice of 4 contrasts: Bright-high, medium and low. Dark.**

MODEL MPEA: Illustrated. 32-600 X. Medium stand with single focusing control. Substage phase diaphragm. Triple nosepiece with objectives: 4 X, 10 X, 40 X. Eyepieces: 8 X, 15 X.

ONLY **$99**

MODEL MPE: Magnification 50-1500 X. Large research stand with coarse and fine focusing, graduated drawtube, mechanical stage. Rack and pinion substage phase condenser. Triple nosepiece with objectives: 10 X, 40 X, 100 X (oil). Eyepieces: 5 X, 10 X, 15 X.

ONLY **$265**

All of above shipped express collect.

Have you ever *seen* a GALAXY?

Or the rings of Saturn, the moons of Jupiter, or the craters and mountains of the Moon? To merely read about the Universe is to deprive yourself of the intellectual excitement of exploring the vast reaches of space. **UNITRON** Telescopes are chosen by leading universities and amateur astronomers for their outstanding quality and proven performance. Unexcelled also for real close-up views of distant terrestrial objects. Write at once for free educational literature on how to select a telescope and illustrating all **UNITRON** models.

2.4" ALTAZIMUTH REFRACTOR

a completely equipped home observatory

Objective: Coated 62 mm diam. 35" focal length. Eyepieces: 100 X, 50 X, 35 X included. 150 X: $14.75. Complete with altazimuth mounting and slow motion controls, tripod view finder, star diagonal, erecting prism system, sunglass, dustcap, wooden cases.

Express collect Only **$125**

OTHER UNITRON REFRACTORS

4 INCH EQUATORIAL	$785.
4 INCH ALTAZIMUTH	466.
3 INCH EQUATORIAL	435.
3 INCH ALTAZIMUTH	265.
2.4 INCH ALTAZIMUTH	125.
1.6 INCH ALTAZIMUTH	75.

Time payment plan available.

ALL INSTRUMENTS FULLY GUARANTEED

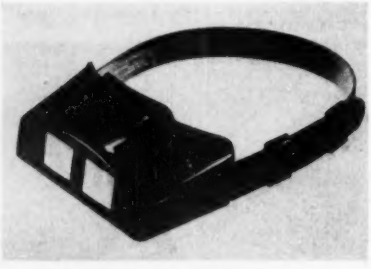
Send check or money order or 25% deposit with balance C.O.D. CATALOGS available on MICROSCOPES for Industrial and Research Laboratories and School and Amateur use. **Write for free Literature to DEPT. N-3**

United Scientific Co.

204-206 MILK STREET, BOSTON 9, MASS.

body wall, with upper and lower surfaces separated by the living and growing tissues within. As differentiation goes on, however, the contents of this thin sac dry out, withdraw, or are resorbed, leaving behind upper and lower surfaces that come together, and sclerotized *tracheae*, the air-breathing tubes which, now useless as air conduits, reinforce the dried adult wing and become known as *veins*, *nerves*, or *tracheae*, according to various writers. Their number and arrangement, described as the *venation*, *neuration*, or *tracheation*, constitutes a means of classification of major importance, and will form the subject of a later article.

Fossil insects begin in the Pennsylvanian and are frequently numerous in certain deposits from that time onward. But unfortunately for a knowledge of their origin, the earliest ones have fully developed wings, and represent such orders as dragonflies and roaches with wings about as today, and no connecting links have as yet been discovered between such primitively wingless forms as the silverfish (Thysanura) and these wing-bearing fossil species. On a basis of the evidence of embryology, insect wings must have begun as planing surfaces that grew out from the body wall, enabling a gliding progression. Next a constriction at the base was necessary so that the whole wing could be moved as if on a hinge. Dragonflies represent this stage and have progressed no further; others have added many refinements and we shall look to the venation to provide clues in unraveling this history when next we discuss this many-faceted subject.



NEW BINOCULAR LOUPE

THE new Edroy *Magni-focuser* incorporates a number of improvements over the usual pattern of binocular loupe. As shown in the accompanying illustration, the lenses are housed in a black cellulose-acetate viewing hood, with an adjustable head band of this same lightweight material. This design cuts out all extraneous illumination, and the object is seen with great clarity. The lenses are prismatic and give stereoscopic magnification. The one we have used was Model No. 10, 3½X, 4-inch focal distance, priced at $12.50; other models have lower powers, longer focal distances, and cost $10.50 each.

Advertising has called attention to the utility of this device for bacteriologists, laboratory technicians, machinists, shop inspectors, and the like. Our purpose in ordering one was to try it out as an aid to minute dissection, primarily in working on the anatomy of the nervous and vascular systems; but in botany, entomology, parasitology, embryology, genetics and many other fields, the Magni-focuser would find ready acceptance. Both hands are left free for holding instruments or manipulating specimens, and the magnification is ideal for a multitude of purposes. For ordering or further information, address Standard Scientific Supply Corp., 34 W. 4th St., New York 12, N. Y.

NEW BOOKS

Physiology

THE third edition of L. V. Heilbrunn's *An Outline of General Physiology* is certainly a most ample outline. This well-known text is now bigger than ever. We cannot say better, but will substitute newer, since every chapter has been revised, some of them extensively. Only one from previous editions, on tropisms, has been omitted. The amount of revision is indicated by the fact that of 4300 references, nearly 1800 are new.

Dr. Heilbrunn writes in the Preface: ". . .at times, I have felt like a man working on a jigsaw puzzle," and goes on to explain how our piecemeal acquisition of bits of knowledge can be made to resolve into a meaningful picture by the one who makes an exhaustive review of the periodical literature. His book is a basic one, a treatise rather than an elementary text: "You can if you please regard this book as comparable to an anthology." And so it impresses the reader as he passes through chapter after chapter on cells and their behavior, on physical and chemical properties, environmental influences, food, growth, oxidation, cyclosis, ameboid movement, ciliary movement, muscular movement, bioluminescence, and on to Chapter 40 on reproduction. It is indeed a monumental work for one man, a synthesis of one of the largest departments of biological knowledge, and a text or reference indispensable to the teaching of physiology. Pp. xiii, 818; figs. 123. W. B. Saunders Co., West Washington Square, Philadelphia 5, 1952. $10.50.

Zoology

A NEW text by an established author is always scanned with interest, and we were enthusiastic over Bernal R. Weimer's *Man and the Animal World*. From the Preface: "The author has tried to avoid writing down to the student. Most college freshmen have already studied biology in high school, and, keeping this in mind, the writer has attempted to prepare a book that presents not a "rehash" of the high school course, but, at a more adult level, a more comprehensive study of animals and their life processes. The book is written primarily for undergraduate students and not for contemporary scientific colleagues."

This gives the keynote, ably fulfilled. Dr. Weimer makes man his central figure, explaining structure and life processes, with sufficient basic chemistry and physics, then compares with other representative animals. There is good balance between facts and principles, frequent expositions of the scientific method, and a natural-history treatment of the taxonomic chapters. Appropriate stress is placed on ecology, genetics, embryology, and evolution, together with some historical and biographical material.

One feature we especially liked is giving the derivation of each technical term the first time it is used. On the other hand we were disappointed at many of the illustrations. They are ample in quantity and well chosen as learning aids, but some of the photographs did not reproduce well, some of the color plates are too poor to justify their cost, and many of the drawings are poorly executed or have crowded detail, too small in size to cajole the student into attempting to decipher them. About half the illustrations should be replaced in a second edition, as they are not comparable in quality with the authorship. This book is one of the best modern texts and merits consideration by all teachers of the subject. Pp. x, 569; color plts. XVI, figs. 296. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, 1951. $5.00.

SONGS FOR ZOOLOGY
OLD GLAND LIVER

Old Man River

Jerome Kern *Showboat*

Doctors all work on the spastic colon,
Surgeons explore for the floating spleen,
Nurses massage every gland that's swollen,
Interns report on the jobs they've seen.
"Pump that stomach! Lance that brain!"
Relieve the duodenum's pain,
Yet if that liver starts to yell
They say, "Aw, give him calomel!"
But who is it stores every carbohydrate?
Cooks up the gunk that can clot the blood?
Grabs any germ that attempts to migrate?
Deaminates all this protein mud?

Old gland liver, that old gland liver,
The brain is heartless, the heart is brainless,
But old gland liver, he just keeps bilin' along.
He don't make L H, he don't make estrin,
And them that makes 'em is always pesterin'
But old gland liver, he just keeps bilin' along.
The heart and lungs, they're hard to heal,
They get a little clot or a pneumocele,
"Close that mitral! Plug that bruit!"
The kidneys, too, have both gone phooey!
The ears are drumming, the eyes are crying,
The thyroid's bursting, the patient's dying!
But old gland liver, he just keeps bilin' along.

Given to you...

IF YOU JOIN THE CLUB NOW AND AGREE TO BUY SIX BOOKS—OF YOUR CHOICE—DURING THE NEXT TWELVE MONTHS

ALL SIX VOLUMES

The Second World War by Winston Churchill

[THE RETAIL VALUE OF THESE SIX BOOKS IF BOUGHT SEPARATELY WOULD BE $36]

—Continued from back cover

FOR THE REST OF YOUR LIFE these six great books will be a possession you will be proud to have acquired, as a memento of your own part, however humble, in this great epoch of human history. The complete set is offered here in this Trial Membership to demonstrate three things about the Book-of-the-Month Club, important to every book-reading family.

★ **FIRST:** that as a member you are kept from missing the important books you want to read. For example, *all six* of the Churchill books were Club selections.

★ **SECOND:** that you get such books from the Club at a considerable saving. For example, the regular retail price for each of these Churchill volumes is $6.00; the price to Club members is only $4.00. Last year, on the average, the price paid by Club members for Selections was *27% less* than the retail price.

★ **THIRD:** that, on top of this, you share in approximately $1,000,000 worth of books, each month, distributed *free* to members as Book-Dividends. These six Churchill volumes may be considered "advanced" Book-Dividends, earned by the purchase of the six books you engage yourself to buy later.

CONDITIONS OF THIS OFFER

★ **YOU AGREE TO BUY AS FEW AS SIX BOOKS** within your first year of membership from among the Club's Selections and Special Members' Editions. During the year at least 100 good books will be made available to you, from which you may choose. You receive a careful advance description of each selection and if you think it is a book you would *not* enjoy, you send back a form (always provided) specifying some other book you may want. Or you may say: "Send me nothing."

★ **YOU WILL RECEIVE ALL SIX VOLUMES OF *THE SECOND WORLD WAR* AT ONCE.** They will be sent with the first book you order from the Club. For a list of good books from which you can choose your first selection, please see coupon below.

★ **AFTER BUYING SIX BOOKS**—and as long as you remain a member—you will receive a Book-Dividend with every second book you buy—a beautiful or useful library volume. This member profit-sharing is similar to what happens in any consumer co-operative. A fixed percentage of what each member pays is set aside in a special fund. This is finally invested in enormous editions of other books, each of which is a Book-Dividend sent *free* to members.

★ **YOU MAY CANCEL YOUR MEMBERSHIP** any time after buying six books. Membership in the Club is for no fixed period, continuing until notice of cancellation is received from the member.

★ ★ ★ ★

THE THEMES OF THE VOLUMES IN CHURCHILL'S OWN WORDS:

1. THE GATHERING STORM: "How the English-speaking peoples, through their unwisdom, carelessness and good nature allowed the wicked to rearm."

2. THEIR FINEST HOUR: "How the British people held the fort ALONE till those who hitherto had been half blind were half ready."

3. THE GRAND ALLIANCE: "How the British fought on, with Hardship their garment, until Soviet Russia and the United States were drawn into the Great Conflict."

4. THE HINGE OF FATE: "How the power of the Grand Alliance became preponderant."

5. CLOSING THE RING: "How Nazi Germany was Isolated and Assailed on All Sides."

6. TRIUMPH AND TRAGEDY: "How the Great Democracies triumphed, and so were able to resume the follies which had so nearly cost them their life."

**Trade-Mark Reg. U. S. Pat. Off. and in Canada.*

BEGIN YOUR MEMBERSHIP WITH ANY OF THESE GOOD BOOKS AS MY FIRST PURCHASE PLEASE SEND ME

- ☐ **CRESS DELAHANTY** by Jessamyn West *$3.75*
- ☐ **SAYONARA** by James A. Michener *$3.50*
- ☐ **THE SPIRIT OF ST. LOUIS** by Charles A. Lindbergh *Price (to members only) $3.95*
- ☐ **TOO LATE THE PHALAROPE** by Alan Paton *$3.50*
- ☐ **THE CAINE MUTINY** by Herman Wouk *$3.95*
- ☐ **FIRE IN THE ASHES** by Theodore H. White *Price (to members only) $3.95*
- ☐ **THE HIGH AND THE MIGHTY** by Ernest K. Gann *$3.50*
- ☐ **THE AGE OF THE MOGULS** by Stewart H. Holbrook *Price (to members only) $3.95*
- ☐ **ANNAPURNA** by Maurice Herzog *Price (to members only) $3.95*

BOOK-OF-THE-MONTH CLUB, Inc. A-1233
245 Hudson Street, New York 14, N. Y.

Please enroll me as a member of the Book-of-the-Month Club.* I am to receive THE SECOND WORLD WAR by Winston Churchill, in six volumes, immediately, with the purchase of my first selection, indicated above. I agree to purchase at least six monthly Selections—or Special Members' Editions—during the first year I am a member. After my sixth purchase, with every second book I buy—from among the Club Selections and Special Members' Editions—I am to receive the current Book-Dividend* then being distributed. I have the right to cancel my membership any time after buying six selections from the Club. After my first year as a member, I need buy only four such books in any twelve-month period to maintain membership. The price to be charged for each book will never be more than the publisher's price, and frequently less. (A small charge is added to cover postage and mailing expenses.)

Name.....
(PLEASE PRINT)

Address.....

City..... Postal Zone No. (if any) ..... *State*.....

Book prices are slightly higher in Canada, but the Club ships to Canadian members without any extra charge for duty through Book-of-the-Month Club (Canada), Ltd.

A DRAMATIC DEMONSTRATION OF THE BOOK-DIVIDEND SYSTEM OF THE BOOK-OF-THE-MONTH CLUB

Given to you...

IF YOU JOIN THE CLUB NOW AND AGREE TO BUY SIX BOOKS—
OF YOUR CHOICE—DURING THE NEXT TWELVE MONTHS

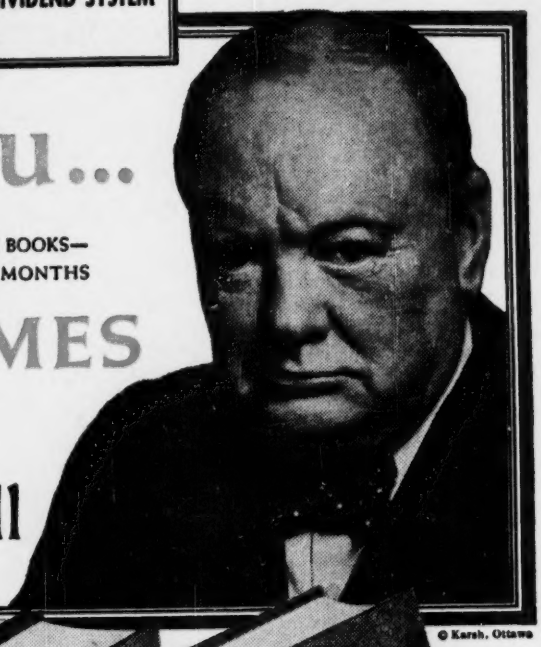
UNIVERSITY MICROFILMS
313 N. 1ST ST.
ANN ARBOR, MICH.

FREE

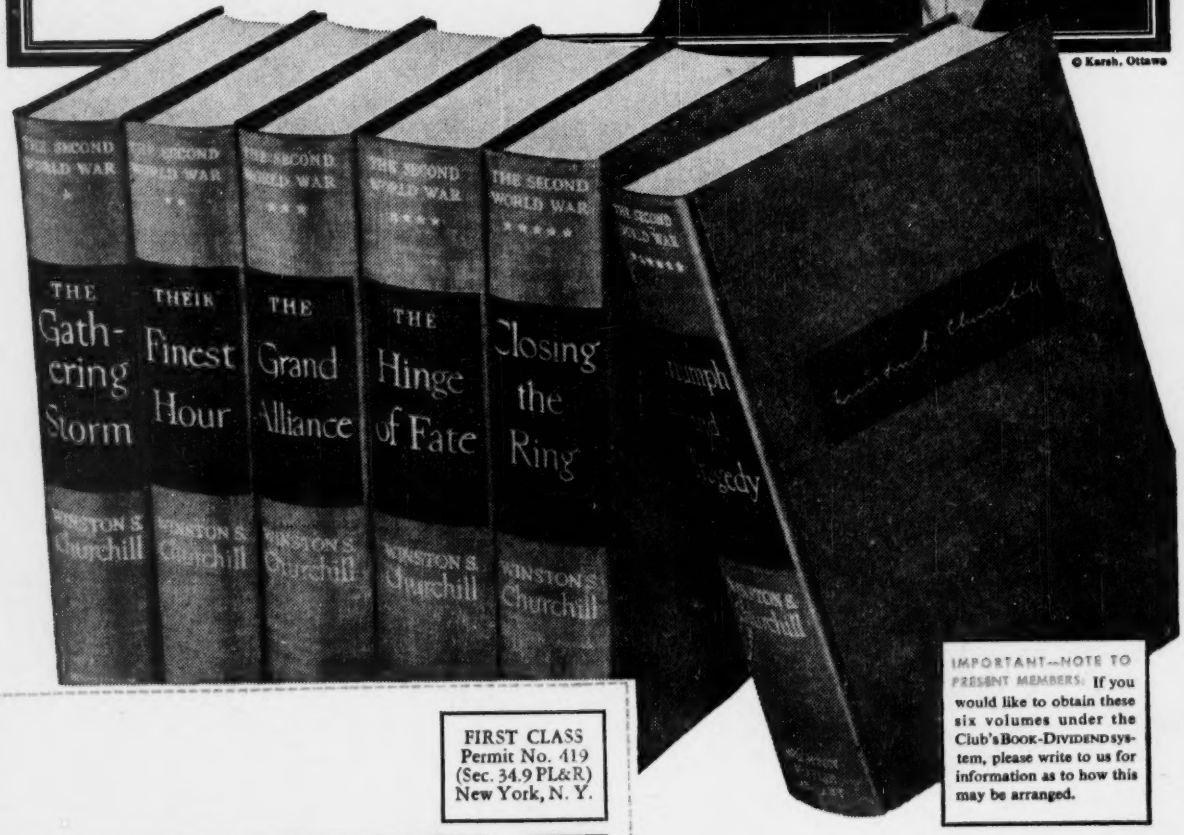
LUMES

War

by Winston Churchill



© Karsh, Ottawa



IMPORTANT—NOTE TO PRESENT MEMBERS: If you would like to obtain these six volumes under the Club's BOOK-DIVIDEND system, please write to us for information as to how this may be arranged.

FIRST CLASS
Permit No. 419
(Sec. 34.9 PL&R)
New York, N. Y.

BUSINESS REPLY CARD
(No Postage Stamp Necessary If Mailed in the United States)

4c POSTAGE WILL BE PAID BY

BOOK-OF-THE-MONTH CLUB, INC.
345 HUDSON STREET
NEW YORK 14, N. Y.

THE RETAIL VALUE OF THESE SIX BOOKS IF BOUGHT SEPARATELY WOULD BE $36

—SEE OTHER SIDE